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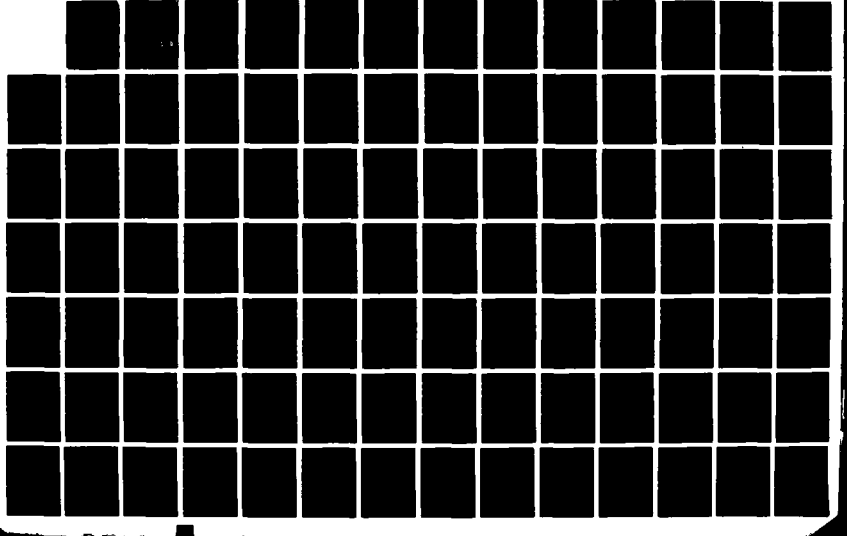

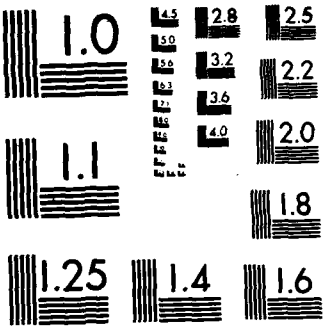

A REPORT ON CURRENT LOGISTICS SYSTEM CONCEPTS

Report DL502R2

December 1985

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Recognizing the changing functional requirements and technological environment throughout DoD, the Office of the Assistant Secretary of Defense (Acquisition and Logistics) has directed the modernization of the Defense Logistics Standard Systems (DLSS), which cover requisitioning, inventory management and control, transportation, contract administration, and other specialized functions. The effort is known as Modernization of Defense Logistics Standard Systems (MODELS). The need for MODELS is intensified by the Military Services and the Defense Logistics Agency (DLA) modernizing their procedures and systems at every level of logistics management and function, and their exploitation of new technology in data processing, computer hardware, and data communication.

The following findings have resulted from our examination of the environments in which DLSS operate, their automated systems, and the current projects of the Services and DLA for modernizing logistics data processing:

- Functional requirements – e.g., logistics management by weapon system, bar coding, and electronic procurement – continue to change and expand. The volume of information that must be exchanged accurately and swiftly among logistics units has grown more than tenfold.
- A variety of vendors provide DoD with hardware, software, and network communications. Therefore, systems that support logistics functions and DLSS procedures will be incompatible, even with Service modernization efforts.

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- Because the individual Services and DLA differ somewhat in their logistics activities, to change policies and standards is a lengthy process.

We recommend that the automated systems and communication networks of the DLSS be made flexible enough to accept and promote progress in logistics management. Management can then make sounder decisions, heighten the readiness and availability of weapon systems and support equipment, and with it all, save money.

Executive Summary

A REPORT ON CURRENT LOGISTICS SYSTEM CONCEPTS

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- 2) A variety of vendors provide DoD with hardware, software, and network communications. Therefore, systems that support logistics functions and DLSS procedures will be incompatible, even with Service modernization efforts.
- 3) Because the individual Services and DLA differ somewhat in their logistics activities, to change policies and standards is a lengthy process.

We recommend that the automated systems and communication networks of the DLSS be made flexible enough to accept and promote progress in logistics management. Management can then make sounder decisions, heighten the readiness and availability of weapon systems and support equipment, and with it all, save money.

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1. INTRODUCTION

BACKGROUND

One key to effective national defense is the availability of skilled manpower with the proper equipment. The mission of the military logistics system is to make sure that United States and allied forces throughout the world have the equipment and spare parts they need when they need them. The logistics system must not only assist in supporting combat readiness for U.S. forces in being, but also assist in supporting future U.S. military forces, and allied forces under international logistics programs.

The managers of U.S. military logistics control the largest inventories and the greatest diversity of items to be found in any organization in the world. More than 5 million different items have been identified, classified, and cataloged under the Federal Catalog System (FCS) within the Department of Defense (DoD). FCS assets on hand are valued at more than $336 billion.

The segment of DoD property holdings of interest in this study is the active "supply system inventory," that is, the inventory of equipment and supplies available for issue to the operating forces. This property, valued at approximately $114 billion (as of 30 September 1983), consists of over 4 million items of weapons, equipment, repair parts, ammunition, vehicles, consumables, clothing, subsistence items, fuel, and medical supplies. It is stocked at depots, posts, camps, bases, supply ships, and stations.

The following logistics management functions associated with these inventories are covered by the Defense Logistics Standard Systems (DLSS):

- Requisitioning materiel
- Transporting materiel
- Accounting and reporting the status of materiel
- Billing for materiel
- Administering contracts

- Reporting discrepancies
- Evaluating performance of logistics activities
- Communicating logistics information.

Genesis of the Defense Logistics Standard Systems

Before the mid-1950's, the Military Services generally provided their own logistics support and therefore controlled their internal systems for purchasing, storing, requisitioning, and distributing materiel. Cross-Service support was limited and usually confined to specialized logistics activities such as subsistence, petroleum, oils, and lubricants. In the mid-1950's, commodity "single managers" were assigned for subsistence, medical items, and clothing and textiles. They were responsible for wholesale-level procurement, inventory management, and distribution of their assigned items to all DoD users and authorized non-DoD users.

The commodity managers negotiated requisitioning procedures with each of the Services. However, these joint Service agreements required the use of different procedures and priority systems depending on the Service managing the commodity. In addition, requisitioners in the individual Services were required to prepare requisitions following different procedures for needed non-single manager items, that is, items managed within the individual Service. During the 1960's and continuing today, single managers were established for other commodities and the Defense transportation operating agencies. With increasing numbers of commodity single managers and proliferation of requisitioning procedures, an inordinate burden was placed on the requisitioners.

Faced with this situation the Office of the Secretary of Defense (OSD) established an ad hoc working group with members from each of the Military Services in the summer of 1961. The group was tasked to develop standard inter-Service requisitioning-and-issue procedures using electronic accounting machinery (punched-card) procedures. It developed the Military Standard Requisitioning and Issue Procedures (MILSTRIP), that was officially instituted 1 July 1962. The OSD, recognizing the need for and value of standard systems such as MILSTRIP, established a permanent Military Standard Systems Office [now known as the Defense Logistics Standard Systems

Office (DLSSO)]. It also led to the development of the family of Military Standard procedures that are now known as the DLSS.

PURPOSE OF THE MODERNIZATION OF DEFENSE LOGISTICS STANDARD SYSTEMS

This section presents (1) the problems with current logistics management systems, (2) a description of the changes in logistics management and the technological environment over the past 20 years, and (3) a description of the intended modernization of the DLSS and the objectives of Phase 1 of the effort.

During the past 20 years, the DLSS have evolved as discrete, but compatible, systems of procedures. As new logistics management requirements are identified (e.g., weapon system logistics management and bar coding of materiel), the DLSS will continue to respond to those requirements. At present, however, some procedures and many of the functional data processing systems are obsolete and impede effective logistics management. There are several reasons:

- Automated systems are 10 to 20 years old and are programmed in COBOL (Common Business Oriented Language), the business language of the 1960's. These systems have been modified extensively to address changing requirements over the years; to make additional changes has become tedious and time-consuming.

- Because systems are old and difficult to change, the Services and the Defense Logistics Agency (DLA) are reluctant to make procedural modifications that will in turn create additional system changes.

- The Services and DLA are all in various stages of system modernization efforts, upgrading automated data processing (ADP) hardware, software, or both. Until they complete these modernization efforts, they are reluctant to make procedural changes in the DLSS that will create requirements for additional system implementation efforts.

- Existing systems are centralized on mainframe computers that process logistics transactions in a "batch" mode; that is, transactions are collected in large batches and processed two or three times a day. Though this is not a major problem in itself, batch systems perform error checking, status checking, and status reporting only when the batch is processed. This slows information flow and limits the ability of the user to interact with the process.

Changes in the logistics management environment during the past 20 years have generally been accommodated by procedural and programming changes in these systems. However, technological changes in the past 5 years have created a momentum for replacement rather than

modification of existing systems. In addition, Congress is demanding improvements in procurement practices, Military Service commanders are demanding better and more timely logistics management information, and users are demanding easier access and rapid response to system inquiries. Eight specific changes creating these demands are discussed below.

Changes in Logistics Management.

The Federal Catalogue System was the starting point for major change in DoD logistics management. Initiated in July 1950, it represented a conversion from a diversity of systems for cataloging items of supply to a single system. This catalog system, for the first time, established a common supply language by assigning a discrete number and description to each individual item in the supply system. Since July 1968, through the central catalog file established at the Defense Logistics Service Center (DLSC) in Battle Creek, Michigan, DoD organizations have been able to compare new items proposed for stockage against all items in the system, to identify whether the same item or a substitute is already catalogued. This has significantly reduced the proliferation of new items into the DoD supply system.

Integrated Item Management.

The next major change occurred in 1962 with integrated item management and creation of the Defense Supply Agency, now the DLA. The new agency assumed integrated management of more than 2.3 million common items for all Military Services. Other single-manager assignments to the Army, Navy, Marine Corps, and Air Force accounted for the remaining 1.7 million items. The Services are continuing to transfer common item management to DLA.

Under the concept, the inventory control point (ICP) for each DoD cataloged item buys, stores, and issues on behalf of all the Services. An item manager handles from 200 to 2,000 items. Most items that remain under the management of an individual Service are unique to it, or directly related to operation of its weapon systems.

Integrated item management almost immediately led to simplification in the organizational structure for supply management. The number of ICPs was halved, from 44 to 22, and many storage points were closed.

Defense Logistics Standard Systems. To derive maximum benefit from integrated management and to ease interchange of stocks among the Services and the DLA, DoD needed a single set of forms, records, and codes for use in requisitioning, shipping, and accounting for supplies within and among them. The standard systems that evolved the Military Standard Logistics Systems Procedures [e.g., Military Standard Requisitioning and Issue Procedures (MILSTRIP), Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP), Military Standard Transportation and Movement Procedures (MILSTAMP)]. In 1983, these standardization procedures for logistics management were redesignated as the DLSS and assigned to DLSSO for administration under the provisions of DoD Directive 4000.25.

Automation of Records. The number of computers devoted to supply management applications has grown tremendously since the early 1960's. The benefits derived from automation include:

- Ability to rapidly store, process, and retrieve information on receipts, issues, and stock balances.
- Capability to prepare reorders (requisitions) as soon as minimum stock balances are reached.
- Ability to more easily track status of requisitions, shipments, contract reorders, and similar activities.
- Capability to electronically transmit and receive information between geographically distant points.

It is estimated that approximately 80 percent of all logistics transactions are now processed without manual intervention.

Improved Communications. To support the growing use of computers by the Services and DLA logistics communities, electronic data communication lines were developed and installed. This capability became available with the implementation of the Defense Communications System, called the Automatic Digital Network (AUTODIN). With this system, it became possible for ICPs, depots, and retail-level suppliers to process and report transactions at a rate of almost 2,000,000 messages per day compared with the 35,000 possible under manual mailing procedures.

Defense Automatic Addressing System (DAAS). To handle the large increases in logistics transactions traffic that followed implementation of computer processing and to help ensure messages go where they should, the Assistant Secretary of Defense (Installations and Logistics) approved the DAAS in 1965 as a permanent part of the logistics pipeline. This system receives and routes DLSS documents electronically with direct on-line connections through AUTODIN. In addition to automatic routing, DAAS performs many other processing and communications functions, including error checking, validation and reformatting for unique Service requirements, and record keeping.

Changing Technological Environment

Just as the logistics management environment changed dramatically during the 1960's and 1970's, the information technology environment is changing dramatically in the 1980's. This decade has already seen the maturing of data base management systems (DBMSs), permitting development of (1) very large relational systems with increasingly easy, rapid, ad hoc access to information; (2) design and implementation of large-scale telecommunications networks that serve heterogeneous hardware systems, thereby broadening direct, on-line access to information; (3) manufacture and widespread installation of powerful personal computers equivalent to mainframe systems of the 1950's and 1960's; (4) integration of data processing and communications permitting interactive multi-user processing and very-high-speed data communications; and (5) digitizing of voice and video for rapid communication over standard telephone lines.

Much of this technological development is in its infancy, and greater increases in speed, capacity, and ease of use can be expected. The Services and DLA are all in the midst of modernizing their hardware systems, redesigning software to take advantage of new DBMS capabilities and networking facilities to enhance the speed and reliability of communication.

Modernization of Defense Logistics Standard Systems

While many of the changes are being driven by technological improvements in data processing and communications, these technological improvements affect the procedural environment as well. To maintain DoD-wide standardized logistics communications while fostering the modernization

efforts of the Services and DLA, the Office of the Assistant Secretary of Defense (Acquisition and Logistics) [OASD(A&L)] has directed modernization of the Defense Logistics Standard Systems (DLSS). This project is designated as the MOdernization of DEfense Logistics Standard Systems (MODELS). One aspect of MODELS is to review and to recommend changes that will simplify and improve the efficiency of DLSS policies/procedures and logistics management processes. A second aspect of MODELS is to review and recommend changes that will incorporate modern technology into a total logistics system design to enhance the effectiveness of DoD's logistics management.

Objectives of Phase 1 – Current System Concepts. Our first task (Phase 1) in modernizing the logistics system is documenting its existing concepts and functions, thus establishing a baseline against which to measure future changes. The MODELS project encompasses both logistics management functions (i.e., requisitioning, shipping, and billing) and data processing (i.e., incorporation of DBMSs, telecommunications organization and installation, and electronic networking).

The objective of Phase 1 is to document the structure and operation of existing logistics management systems. Therefore, this documentation has been prepared and is included as part of this report. It encompasses:

- Descriptions of the roles of the various organizational elements responsible for – or participating in – DLSS (Chapter 2)
- Descriptions of the 14 major DLSS procedures, including the data relationships and information flowing among them (Chapter 2)
- Description of changes already underway within the Services and DLA to upgrade or replace existing hardware and software (Chapter 3)
- Discussion of existing system communications and data processing interfaces, including local area networks (LANs), wide area networks (WANs), intelligent gateway processors (IGPs), and their applicability to logistics management. (Chapter 4)

Finally, Chapter 5 describes possible effects of continuing modernization efforts on the overall logistics system's operations and effectiveness, including changes in organizational relationships and responsibilities that may result in DLSS procedural or policy changes.

2. PRESENT ORGANIZATIONAL AND PROCEDURAL RELATIONSHIPS OF THE DEFENSE LOGISTICS STANDARD SYSTEMS

This chapter describes the DLSS functions, discusses the organizations responsible for performing the functions and concludes with a brief description of the 14 specific DLSS and their interrelationships.

DLSS FUNCTIONS

The logistics management processes encompassed by the DLSS include five major functional activities: (1) requisitioning, (2) inventory management, (3) transportation, (4) contract administration, and (5) specialized functions.

Requisitioning

Requisitioning is the ordering of needed materiel and equipment from the supply distribution system. All DoD activities engage in the requisitioning process. It is common for the field unit base, station, or ship—referred to collectively as the "retail unit"—to act as the primary requisitioning activity. The requisitioning system is also used by organizations outside DoD, such as the General Service Administration (GSA) for civilian agencies, the Department of Transportation for the Coast Guard, the Federal Aviation Administration, and defense contractors when authorized under the terms of a contract. The requisitioning function, as described in the Military Standard Requisitioning and Issue Procedures (MILSTRIP), is not mandatory for internal transactions at posts, camps, stations, bases, or their equivalents for support of local organizations and satellite activities. But, all Military Departments have adopted most of the data elements (e.g., part number) and codes [e.g., National Stock Number (NSN)], as well as some of the formats of MILSTRIP for use at this retail level.

Inventory Management and Control

Inventory management and control is the maintenance of the accounting and reporting records needed to fill a requisition promptly. This function is described by the Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP). These procedures are

followed by the Services and DLA ICPs in supply and financial management. The inventory records maintained at the ICP denote item ownership, purpose, and condition. The accounting records identify the supplier, the cost, and the recipient to be billed. Under the concept of integrated materiel management, the ICP has overall responsibility for purchase, warehousing, and inventory of their assigned items.

Transportation

Transportation covers the movement of materiel (requisitioned or excess) from the source (contractors, stock control activity, or storage location) to the ultimate destination (retail user or disposal facility). For reparables and excess items (retrograde), the direction of movement is reversed. Careful planning is essential in developing a DoD transportation program: transportation requirements worldwide must be determined and the capacity of all means of transportation analyzed (commercial and DoD assets) with priorities established. For example, during peacetime, more than 50 percent of overseas transportation is for non appropriated funds merchandise (commissary and exchange goods, personnel household goods, and privately-owned vehicles). In a wartime situation, this merchandise has low priority. The Transportation Operating Agencies have responsibility for land, sea, and air materiel movement in the Defense Transportation System (DTS). DoD traffic management officials throughout the logistics network perform transportation management and control functions using uniform methods, standard procedures, and data prescribed by DoD Military Standard Transportation and Movement Procedures (MILSTAMP). Of the DLSS procedures, MILSTAMP data flow is the most time critical since the materiel it is associated with is already moving on a parallel, but separate pathway. Thus, if data flow problems occur, they result in materiel receipt problems at the next port or carrier receipt point. With few exceptions, all logistics materiel entering the DTS must be processed in compliance with MILSTAMP. Commercial transportation within the Continental United States (CONUS) is governed by provisions of the joint Army regulation (AR55-355), the Military Traffic Management Regulation. The reporting of discrepancies is covered in the joint regulation (AR55-38), "Report of Transportation Discrepancies in Shipment."

Contract Administration

Contract administration is the function that controls and monitors the flow of products and services from commercial producers of DoD supply items to stock control activities and retail users. The function also includes the flow of information among purchasing offices, contract administration offices, and item managers. This flow of information is partially standardized by the Military Standard Contract Administration Procedures (MILSCAP).

Specialized Functions

Specialized functions covered by the DLSS in the logistics management process include such activities as:

- Billing of Service/DLA stock funds and industrial funds for items requisitioned by retail users (MILSBILLS[1])
- Maintenance of extensive activity address directories for shipment of materiel for both DoD (DoDAAD[2]) and foreign military sales under the Military Assistance Program (MAPAD[3])
- Reporting of shipping or materiel discrepancies (ROD[4])
- Logistics management for petroleum products (MILSPETS[5])
- Development and management of logistics data elements to be used in standard logistics management systems (LOGDESMAP[6])
- Development and maintenance of a system to transmit logistics transactions electronically to the proper recipients (DAAS[7])
- Administration of procedures for measuring performance of supply systems and effectiveness of transportation throughout DoD (MILSTEP[8])

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[1]Military Standard Billing System (MILSBILLS).

[2]DoD Activity Address Directory (DoDAAD) System.

[3]Military Assistance Program Address Directory (MAPAD) System.

[4]Report of Discrepancy (ROD) System.

[5]Military Standard Petroleum System (MILSPETS).

[6]DoD Logistics Data Element Standardization and Management Program (LOGDESMAP).

[7]Defense Automatic Addressing System (DAAS).

[8]Military Supply and Transportation Evaluation Procedures (MILSTEP).

ORGANIZATIONAL FUNCTIONS

The overall policy governing DoD logistics management is delegated by the Secretary of Defense to the Assistant Secretary of Defense (Acquisition and Logistics). The specific responsibility for policy governing DoD logistics standard systems is further delegated to the Deputy Assistant Secretary of Defense (Logistics and Materiel Management). The development of DLSS procedures and administration and the surveillance of these procedures are the responsibility of the DLSS Office (DLSSO), designated a management support activity of and receiving administrative support from DLA.

Defense Logistics Standard Systems Office

The DLSSO promulgates DoD Directive 4000.25 for DoD. This directive is converted into Service and DLA-specific policies and procedures conforming to the DLSSO-established standardized data element formats and coding. Though the individual Services each have generally the same alignment of responsibilities, there are differences, as discussed below.

Defense Logistics Agency

As manager of 2.2 million of the 4 million active items in the Federal Supply Catalog, DLA is a major managing agent of military inventories for DoD. Items assigned the agency for integrated management are managed centrally by six defense supply centers, which perform all the usual functions of inventory management. Materiel is distributed through storage activities that receive, store, and issue DLA-owned materiel under direction of the center that is accountable for the items.

The Defense Logistics Materiel Distribution System consists of 33 storage locations in CONUS. These depots are responsible for receiving materiel, storing it, keeping a physical inventory, maintaining it while in storage, and issuing it. Perishable subsistence and bulk petroleum products are not stored at these depots, but at specified storage points and terminals. Of the 33 storage locations for DLA materiel, six are managed by DLA. The other 27 storage locations are managed by individual Services.

Storage activities of DLA are identified as either principal distribution depots or specialized support points, according to the distribution mission being performed. A principal distribution depot is a DLA-managed storage activity that receives, stores, and issues materiel of one or more DLA commodities, as directed by defense service centers, in support of all DoD and civil agency requisitioning activities within the depot's geographic distribution area. A specialized support point is a Service-managed storage activity distributing DLA-owned materiel in which the commodity range and depth are tailored to NSNs meeting specific demand criteria of a specified range of Service requisitioners, such as the Naval Fleet or the Army's direct support system in Europe.

DLA also operates six service centers:

- Defense Logistics Service Center (DLSC), responsible for DoD-wide cataloging. The Federal Catalog System is a Government-wide program to provide a uniform system of item identification and to assign an NSN to all items of personal property used by the Government departments and agencies.
- Defense Reutilization and Marketing Service, responsible for materiel reutilization and the reutilization or disposal of surplus personal property.
- Defense Industrial Plant Equipment Center, responsible as the focal point within DoD for storage and redistribution of idle industrial plant equipment.
- Defense Technical Information Center (DTIC), responsible for operation of DoD research and development, and test and evaluation scientific and technical information systems; acquisition, storage, announcement, retrieval, and secondary distribution of scientific and technical documents; and primary distribution of foreign technical reports.
- DLA Administrative Support Center (DASC), responsible for providing administrative support and common service functions to DLA activities within the Washington, D.C., metropolitan area.
- DLA Systems Automation Center (DSAC), responsible for all DLA automated systems and telecommunications support throughout the world.

In 1962-63, a study known as Project 60 was conducted under the policy guidance of high-level DoD military and civilian personnel. The study indicated considerable overlap and duplication in contract administration among the Services. The study further indicated the feasibility of consolidating these functions. In 1964, the Secretary of Defense assigned responsibility for all contract administration services to DLA.

Conversion and organization of the Defense Contract Administration Service (DCAS) was completed in 1965. The field structure consists of nine DCAS Regions (DCASR), which are responsible for administering contracts under the centralized management concept within their specific geographical alignment in CONUS, as well as Canada and specific overseas areas. In addition, DCASRs have subordinate organizations, which perform contract administration services for specific areas within regions, areas, and sometimes offices at contractor plants. These organizations consist of management areas with area responsibility and plant representative offices with contractor plant responsibility.

Several DLA systems provide DoD-wide logistics management functions:

- Defense Integrated Data System (DIDS) is the ADP system used to process, store, maintain, and disseminate Federal Catalog System data. The system is operated and maintained by the Defense Logistics Service Center (DLSC), a DLA field activity in Battle Creek, Michigan. DIDS is a unique system designed to interface with and support the logistics systems of DoD components, U.S. civil agencies, U.S. Government contractors, and foreign governments. The major goals and objectives are to: (1) establish a central repository of logistics management information, clearly identified as to source, format, and function; (2) provide a completely integrated data record, structured to furnish rapid accurate logistics data support; and (3) integrate national stock number (NSN) data into a common authoritative source file for use by the entire Federal Government's logistics community.

- Freight Classification Guide System is a component of DIDS that contains rail and motor freight classification data by NSN, hazardous materiel handling requirements data from the Code of Federal Regulations and International Maritime Organization, and MILSTAMP commodity code transportation requirements. The system is used by shippers to prepare shipment documentation.

- Defense Regional Inter-Service Support Program is served by a centralized data bank containing data from the Inter-Service Support Agreement (DD Form 1144). The data bank provides a central repository of supplier information that may be systematically applied against requirements for specific categories of support services to preclude duplication of services when such services can be provided more economically by a dominant user. The data bank contains information regarding the supplier, receiver, geographic area, type of service supplied, and related cost factors in terms of dollars and personnel resources.

- Defense Fuel Automated Management System (DFAMS) is an automated system designed to facilitate all Defense Fuel Supply Center missions related to inventory management, procurement, financial control, and accounting for bulk petroleum products. The system relies on transaction reporting from DoD and government activities engaged in ordering fuel from industry and issuing DoD-owned fuel to retail military installations. Transaction reporting as prescribed by MILSPETS is

accomplished via direct computer terminals, microcomputer links, facsimile, and AUTODIN including optical character recognition input interfaces.

- Defense Reutilization and Marketing Service is the centralized data system that supports the DoD disposal program. The system provides a standard mechanized accounting system for controlling, reporting, and screening all excess and surplus personal property. The system is made up of three major subsystems: property accounting, reutilization, and marketing.

- Defense Automatic Addressing System (DAAS) was established as a permanent part of the logistics pipeline in 1965. The DAAS functions 24 hours per day, 7 days per week at two locations: the Defense Electronic Supply Center, Gentile Air Force Station, Dayton, Ohio, and the Defense Depot, Tracy, California. The system and its supporting organizations and independent hardware function as real-time multiple processing centers with direct computer connections with the Services and DLA through AUTODIN. While DAAS performs many services for its customers, its prime mission is getting the logistics documents to the right source of supply with the least practical delay. The Services and agencies rely on DAAS routing and processing capabilities for transmitting data to each other. This system, as a major information communications interface, is discussed in greater detail in Chapter 4.

Other Organizations

The General Services Administration (GSA) and its Office of Federal Supply and Service work in close coordination with DoD to provide worldwide supply support to military activities for items assigned to GSA for integrated materiel management. GSA is assigned 70 Federal Supply Classes for national management, responsibility for the procurement of commercial vehicles and trucks, and management of over 8,000 commercial items in classes assigned to DLA. GSA serves as the Commodity Integrated Materiel Manager for DoD activities for these assigned classes. GSA communications facilities are interconnected with the AUTODIN. All military requisitions and related communications, originating worldwide, are transmitted by way of the defense network, through DAAS, and enter the communications facilities of GSA through its switching centers and the Federal network, which, in turn, automatically distribute traffic to the appropriate GSA activities.

The Defense Transportation System (DTS), like the supply system is organized on a single transportation manager concept to facilitate planning and movement of materials in both CONUS and outside CONUS. The three DoD single manager transportation operating agencies designated to support DoD requirements are the Military Traffic Management Command (MTMC), Military Sealift Command (MSC), and Military Airlift Command (MAC). MSC and MAC are primarily mode

oriented; MTMC acts as the interface between defense shippers and commercial and defense carriers and port operators.

MTMC, a major command of the Army, is the operating agency through which the Secretary of the Army executes his responsibility as the DoD's single manager for military traffic, land transportation, intermodel containers, and common user ocean terminals. MTMC provides the "how" of movement; the military shipper decides "when, where, and what" is to be moved. As a port operator, MTMC provides common user ocean terminal services and cargo bookings to DoD. As a transportation manager, MTMC manages volume freight and passenger transportation via commercial carriers in CONUS and manages the worldwide personal property movement and storage program. As a transportation adviser, MTMC evaluates defense transportation activities and recommends system improvements to the OSD and the Services.

Field activities commanded by Headquarters, MTMC, are: the eastern and western area commands in CONUS; the Transportation Engineering Activity; and the Transportation Terminal Command, Europe.

The single manager for ocean transportation is MSC, a major operating force of the Navy, organized as a worldwide command. As the operating agency for ocean transportation, MSC performs a fourfold mission:

- Provides peacetime ocean transportation for DoD and other authorized agencies
- Provides an immediate sealift capability in emergencies
- Plans for expansion in emergencies
- Provides ships for oceanographic exploration, range instrumentation, missile tracking, and other assorted activities.

MSC has four sources of sealift capability by which it can meet shipping requirements, MSC Controlled Fleet, the U.S. Merchant Marine, the National Defense Reserve Fleet, and, in times of national emergency, foreign flag and U S controlled ships.

The single manager for air transportation is MAC. MAC is an Air Force major command and a specified command that reports directly to JCS MAC provides common-user airlift services

between points in the United States and overseas areas and between and within overseas areas. More than 20 U.S. civilian airlines have committed their most suitable airlift capability for use in military contingencies. This commitment enables these airlines to share in the MAC peacetime transportation business.

Army

The Secretary of the Army is responsible for implementing all DoD directives and instructions that deal with the supply system. The Secretary is aided in supply and logistics matters by the Assistant Secretary of the Army for Installations, Logistics, and Financial Management (IL&FM). Within the Army Staff, the Deputy Chief of Staff for Logistics (DCSLOG) is the principal adviser to the Chief of Staff on logistics matters. The DCSLOG has Army General Staff responsibility for developing and supervising of the Army logistics organization and systems worldwide, including plans, policies, programs, doctrine, and standards.

The U.S. Army Material Command (AMC) is responsible for all materiel management functions for most Army technical services, including research and development, test and evaluation, procurement and production, storage and distribution, inventory management, maintenance, and disposal. AMC is a nationwide network of 65 installations and 101 subinstallations and separate units. AMC has inventory management responsibility for about $21.7 billion in wholesale stocks on hand in CONUS depots.

AMC operates through major subordinate commands to direct the activities of depots, laboratories, arsenals, maintenance shops, proving grounds, test ranges, and procurement offices throughout the United States. These operating commands are commodity-oriented organizations charged with the management of items associated with their respective missions. Each of the operating commands has commodity management centers referred to as national inventory control points (NICPs). The NICPs are responsible for the national level management of inventories of assigned commodities through the inventory manager. The NICPs perform the following logistics management functions:

- Catalog direction

- Requirements determination
- Procurement direction
- Distribution planning
- Inventory control
- Maintenance direction
- Materiel redistribution and disposal.

The AMC major subordinate commands and their areas of responsibility are:

- Armament, Munitions, and Chemical Command – responsible for armament systems and ammunition including towed and self-propelled artillery, mortars, recoilless rifles, rocket launchers, individual and crew-served weapons, and all conventional ammunition.
- Aviation Systems Command – responsible for both fixed-wing and rotary-wing aircraft.
- Communication-Electronics Command – responsible for the full spectrum of services to the soldier in the field for communications-electronics and for nontactical commercial broadcasting and television equipment for the Armed Forces.
- Missile Command – responsible for managing the Army's missile and rocket program, including all foreign military sales.
- Tanks-Automotive Command – responsible for combat, tactical, special-purpose, and construction vehicles.
- Test and Evaluation Command – responsible for planning, conducting, and reporting results on systems development tests and on other tests performed during a principal items life-cycle. It supports the other Services for specific type tests as well as test and evaluation of foreign materiel considered for U.S. acquisition.
- Army Troop Support Command – responsible for troop support equipment including amphibious and watercraft, generators, bridges, water purifiers, camouflage, mine detectors, air conditioners, fuel storage equipment, compasses, and surveying instruments.
- Electronics Research and Development Command – the Army center for research and development and acquisition of intelligence and electronic warfare equipment along with general electronics and electro-optics technology basic research.
- AMC-Europe – an extension of AMC that exercises command and operational control of all AMC activities supporting the Army in Europe.
- U.S. Army Security Assistance Center – the focal point within Department of the Army for coordination and interface of security assistance program activities worldwide.

- Depot System Command (DESCOM)—commands and controls the 12 depots and 7 depot activities in the United States and West Germany that comprise the Army Depot System.

DESCOM is the major AMC interface with Army field units. The DESCOM depots store and ship a broad range of general supplies and ammunition managed by the Army, DLA, and GSA to United States and allied units worldwide. In addition, DESCOM is responsible for maintaining, overhauling, and repairing all major Army systems, from tanks to hand-held range-finding units.

Other AMC activities directly involved in the DLSS functional processing of logistics information include:

- Logistics Systems Support Activity which is responsible for the design, development, and maintenance of standard ADP systems for AMC depots and other selected AMC activities.
- Automated Logistics Management System Activity which is responsible for the design, development, and maintenance of ADP systems for AMC major subordinate research and development commands.
- Catalog Data Activity which is responsible for the centralized collection, maintenance, and distribution of logistics management data.
- Logistics Control Activity (LCA) which maintains detailed data files of individual requisitions and shipments as they are processed through the logistics pipeline.
- Materiel Readiness Support Activity which provides logistics evaluation of new or product-improved materiel.

Air Force

In the Air Force, like the Army, the Secretary of the Air Force has an Assistant Secretary of the Air Force for Manpower, Installations, and Logistics (MI&L). The Air Force Chief of Staff, responsible to the Secretary of the Air Force, has operational control of logistics management and is assisted by the Deputy Chief of Staff, Logistics and Engineering.

There are 15 major commands and 14 separate operating agencies which together represent the field organization of the Air Force. These commands are organized on a functional basis in the United States and on a geographic basis overseas. MODELS is affected by two of these commands, the Military Airlift Command (MAC) and the Air Force Logistics Command (AFLC).

MAC is a major command and a JCS specified command. Its primary mission is to provide air transportation for personnel and cargo for all the Services on a worldwide basis.

AFLC is responsible for wholesale logistics support for Air Force commands and units. This includes specialized logistics training, technical guidance, control, and supply support in all its aspects. AFLC operates five air logistics centers (ALCs) in CONUS. These centers control depot storage operations and provide logistics assistance to Air Force activities within their geographic area of responsibilities. These centers, the Air Force ICPs, are worldwide managers for commodity classes and weapons systems assigned to them and have the depots co-located with them. The five Air Force ALCs are located at Warner Robins, Georgia; Oklahoma City, Oklahoma; Ogden, Utah; San Antonio, Texas; and Sacramento, California.

AFLC assigns sole supply management responsibility for assigned weapon-oriented Federal supply classes to inventory managers at the five centers. These inventory managers perform the worldwide supply management functions of computing requirements, cataloging, distribution, and disposal for assigned items. Air bases, in turn, requisition materiel directly from the inventory managers for supply of the desired item.

The air base level is the heart of the Air Force supply system. At the air base level, the consolidated base supply activity is responsible for the overall management, technical supervision, and maintenance of accountable records for most of the supplies consumed by operating units. The base supply activity is the first echelon of the Air Force supply system. At this level, supplies are issued to the customers or consumed by the base itself. As the final point of demand, the base provides the necessary consumption data that guides the worldwide replenishment, distribution, and procurement of Air Force stocks. Bases also draw support from other Services, DLA, and GSA. Overseas bases receive direct support from the applicable source of supply. All retail customers currently communicate with the Air Force wholesale supply system by AUTODIN. Within CONUS, an air transport system, operated by commercial carriers under contract with the Air Force, links air logistics centers, bases, and aerial ports of embarkation on regular schedules. Overseas air movement is handled by the MAC, augmented by commercial carriers, where necessary.

Navy

The Navy has unique requirements that determine the characteristics of its supply system. The Navy is a composite warfare system, a mix of ships and submarines, aircraft of various configurations, missiles, and supporting installations manned by military personnel. Logistics support throughout the Navy, as well as the organizations that provide this support, are the responsibility of the Chief of Naval Operations.

Under the Chief of Naval Operations, there are five major commands:

- Naval Air Systems Command – responsible for aircraft and airborne weapon systems.
- Naval Electronics Systems Command – responsible for shore-based electronic systems and certain common-use airborne and shipboard electronic equipment.
- Naval Facilities Engineering Command – responsible for administration of the Navy military construction program, facilities planning, facility maintenance and utility operations, real property inventory management, and natural resources and pollution control programs.
- Naval Sea Systems Command – responsible for *whole* ships and craft and for ordnance shipboard components and auxiliary equipment; coordination of systems integration of all shipboard subsystems, procurement, technical guidance, and supervision of operations related to salvage of stranded and sunken ships and craft.
- Naval Supply Systems Command – responsible for supply management policies and methods; administration of the Navy Supply System, publications and printing, the resale program, the Navy Stock Fund, the field contracting system, transportation of Navy property; and material functions related to materials handling equipment, food service, and special clothing. The command is also responsible for the supply, budgetary, fiscal, and statistical functions in support of assigned military assistance and international logistics programs.

As the principal supply agent for the Navy, the Naval Supply Systems Command conducts the formalities of contracting by formal advertising for other Navy procuring activities to the extent provided in regulations. Of the 4 million items in the DoD supply system, about 1.7 million are used by the Navy. Forty-five percent of these items are managed and controlled by the Naval Supply Systems Command through its two ICPs. The remaining items are managed by DLA or GSA, but are controlled for the Navy through the Navy Retail Office located at the Fleet Material Support Office, Mechanicsburg, Pennsylvania.

There are two Navy ICPs. Their basic assigned material responsibilities are:

- Aviation Supply Center – Equipment and parts peculiar to Navy and Marine Corps aviation; photographic and aerological equipment and parts.
- Ships and Parts Control Center (SPCC) – Conventional ammunition, shipboard, base and ordnance equipment, electronics equipment, and repair parts.

In addition, the Naval Publications and Forms Center at Philadelphia performs inventory manager functions for Navy-managed forms, publications, and placards. It is also the single DoD stock point for specifications and standards.

The prime characteristics of Naval operating forces, their readiness, mobility, and endurance, prescribe the form of support that the Navy supply system must provide. The fleet is virtually always mobilized. Conceptually, Navy fleet supply support is based on an organic level of supply and two echelons of resupply: (1) the mobile logistics support ships and overseas bases, and (2) the supply centers in CONUS.

The organic level provides the material specified in a Coordinated Shipboard Allowance List or Aviation Consolidated Allowance List (i.e., material carried on board the ship/plane). The allowance list is tailored to the individual craft based on its equipment, military essentiality of the ship's systems, and the composition and size of the crew. The range and quantities of demand-based allowances provide balanced support for an average endurance period of 3 months.

The first echelon of combat resupply support consists of the ships of the Mobile Logistics Support Forces, which include tenders, repair ships, and fleet issue ships. This force is augmented by overseas depots. This echelon of fleet support backs up the allowance list material carried in the combatant ships. Fleet issue ships play a special role. These ships carry cargoes of consumable items and frequently requested repair parts tailored to the combat forces they support. They rendezvous with task forces in the forward area and, by ship-to-ship or helicopter transfer, keep the fleet on station for extended periods.

The material carried in the mobile logistics support ships is prescribed in accordance with load lists that reflect the support mission and the types of ships supported. The load lists, like the ships' allowance lists, prescribe both the range and quantity of material to be carried aboard the

individual mobile logistics support force ships to increase the combatant ship's endurance by providing a convenient source of repair parts and general consumable items. This combination of supply levels satisfies the Chief of Naval Operations' policy that the deployed fleet is to be self-sufficient during wartime operations lasting 3 to 6 months without resupply from CONUS.

The second echelon of resupply provides the material that is stored predominantly at tidewater centers in the United States. These supply activities serve as the material reservoir and act as pipelines between industry and other supply systems and the fleets. These Navy supply centers stock material managed by the Navy, DLA, and GSA. This material is issued to the mobile logistics support forces and directly to the operating forces.

In addition to fleet support, the stock supply centers support the activities of the shore establishment: air stations, ordinance stations, shipyards, training stations, and smaller shore activities. The scope of the supply departments at shore activities varies, depending on the size and mission of the activity. Size can range from a small retail outlet called a ready supply store to a large supply department at a shipyard or major air station. These large supply departments at major air stations, shipyards, ammunition depots, and construction centers support not only the Navy, but also the Marine Corps, Coast Guard, other Services, and friendly countries under the Military Assistance Program.

The basic responsibility for providing the supplies to meet total user needs for most of the Navy supply items rests in the ICPs. The ICPs determine the quantity and range of items to be carried at specific stock supply centers; position these inventories; and determine, in collaboration with the hardware systems commands and customers served, the individual support missions that these stock points will carry out.

The stocks of materials located at secondary stock points, smaller air stations, training stations, naval bases, and ordnance stations are held primarily for their own use. These activities generally determine their own stock requirements and do not support any significant number of activities other than themselves. Although the ICPs establish policies for stock levels and analyze

financial inventory reports for material at these activities, they do not directly control these inventories; consequently, the ICPs do not draw on these stocks to meet needs elsewhere.

To exercise Navy financial control and retail management of material managed at the wholesale level by DLA, GSA, and the other Services, the Navy established a Navy Retail Office at the FMSO. This office provides non-Navy integrated item managers with applicable Navy program requirements, and develops and publishes working procedures for management of retail stocks. Retail stock levels are presently monitored by using financial inventory control data and by field service visits rather than through an individual item reporting system.

Marine Corps

The flow of fundamental logistics management policy is from the Office of the Secretary of the Navy (Shipbuilding and Logistics) to the Commandant of the Marine Corps. The Commandant's staff includes the Deputy Chief of Staff for Installations and Logistics, who establishes allowances of major end items, provides logistics policy guidance, and is responsible for the operation of the logistics system.

In 1967, the Marine Corps implemented a logistics management concept called the *in-stores element* which is managed under the Unified Material Management System. This concept combined all management functions normally associated with military supply into a single integrated system. The in-stores element includes those assets and their management functions that are under centralized item and/or financial accountability and control. The organizational structure to satisfy the objectives of the Marine Corps' Unified Material Management System (MUMMS) consists of Headquarters, Marine Corps, one inventory control point located at the Marine Corps Logistics Base (MCLB) at Albany, Georgia, and two remote storage activities (RSAs). The two RSAs are located at the MCLB at Albany, Georgia, and the MCLB at Barstow, California. The RSAs at Albany and Barstow provide logistics support for Fleet Marine Forces (including Reserve) in the Eastern United States and the Atlantic theater, and the Western United States and the Pacific theater, respectively.

The ICP is the central supply processing point and the central coordination and technical direction agency for operation of MUMMS. As such, the ICP controls all actions required in acquisition, availability, and disposal of the material assets in the system. The functions conducted at the ICP include:

- Requirements determination
- Procurement
- Receipt control
- Stock and issue control
- Inventory analysis
- Budgeting
- Financial store accounting
- Pricing
- Cataloging
- Performance measurement
- Determination of excesses
- Reporting
- Calculation of mobilization reserve requirements for centrally managed, locally procured, and integrated manager items.

The two remote storage locations in the Marine Corps Stores Distribution System are geographically located adjacent to the CONUS units they serve and are able to effectively support units deployed overseas from either coast. Each RSA is a part of the base at which it is located. The base commanders exercise all aspects of command over the RSA, except in the area of technical direction, which is under the cognizance of the ICP.

The general functions conducted by the RSAs are warehousing, material management, customer service, physical distribution control, and management of locally controlled items. The RSAs function in direct support of the Fleet Marine Forces by providing depot-level repair and rebuild, and serving as the principal storage sites for prepositioned mobilization stocks.

The second level of Marine Corps supply support consists of the intermediate supply support elements called Supported Activities Supply System (SASSY) Management Units (SMU). These units support Force Service Support Groups (i.e., divisions, air wings, or combined division/wing teams). The SMUs are the connecting links between the unit-level account and the ICP. They are mechanized, mobile, and capable of deploying with the major units for a prescribed level of operations. These support elements perform their own inventory accounting through standard computerized procedures controlled by Headquarters, Marine Corps. The using units requisition material from the general accounts of the SMUs, where their demand is either filled, backordered, or passed to the integrated material manager. SMUs replenish general accounts in accordance with stock levels computed from usage.

The third portion of the Marine Corps supply system is the out-of-stores element. This is the user element and consists primarily of the assets physically held by units of the Fleet Marine Forces (e.g., posts, camps, stations, and Recruiting and Reserve Districts). Material in the out-of-stores element is not centrally managed.

THE DLSS AND THEIR INTERRELATIONSHIP

From the above organizational function descriptions, it is evident that the logistics management process in DoD involves a myriad of organizations with differing responsibilities and processing requirements. Single integrated item management and single transportation management concepts have improved management effectiveness and increased availability of supplies while reducing supply inventory costs. These concepts required the standardization of communication and transaction processing regarding supply activities throughout the DoD. This need has led to the design, development, and implementation of the Defense Logistics Standard Systems (DLSS). An overview of the DLSS and the relationships of interfaces between them are described below, followed by a more detailed description of the processing for each DLSS.

DLSS Functions

The DLSS define the interface formats, maximum processing times, measurement of performance statistics, error checking and screening procedures, routing procedures, and

transmission media required for effective interaction between organizations within the Defense logistics community. It is not possible to define the functions of the DLSS without considering the manner in which they define the flow of information between the organizations that make up the logistics community. The basic organizational units include the requisitioning activity, the Inventory Control Point, the depot, the transportation supplier, and the contractor.

Relationships Among Elements of the DLSS

This section summarizes the flow of logistics information among organizations and the effect of the DLSS on this flow. There are many variations and exceptions among the Services and DLA. The purpose here is to concentrate on the general process itself, thus the following processes are greatly simplified.

The Requisitioning Process

The DLSS that control the flow of information during the requisitioning process include MILSTRIP, MILSTRAP, MILSTAMP, and MILSBILLS. MILSTEP defines the evaluation data used to monitor this process; DoDAAD and MAPAD are used as address data bases for the routing of documents; and DAAS is used as the telecommunications gateway that directs, controls, and monitors the flow of information through the process. ROD is used to report shipper errors during requisition processing.

As shown in Figure 2-1, the basic requisition process is initiated by the requisitioning activity using the requisition form whose format is defined by MILSTRIP. Under normal procedures, the requisition is transmitted via AUTODIN to DAAS, which directs it to the proper ICP. Other requests from the requisitioning activity, including requests for status, modifiers, and cancellations, flow through this same route.

When the requisition has been received and approved by the ICP computer, a materiel release order (MRO) is sent through DAAS to the depot. If the depot has the materiel in stock, it replies with a Materiel Release Confirmation (MRC), which is sent through DAAS to the ICP. If the materiel is not available, the depot transmits a Materiel Release Denial (MRD) through DAAS to the ICP. MROs, MRCs, and MRDs are defined by MILSTRIP.

FIGURE 2-1. OVERVIEW OF THE REQUISITION FLOW

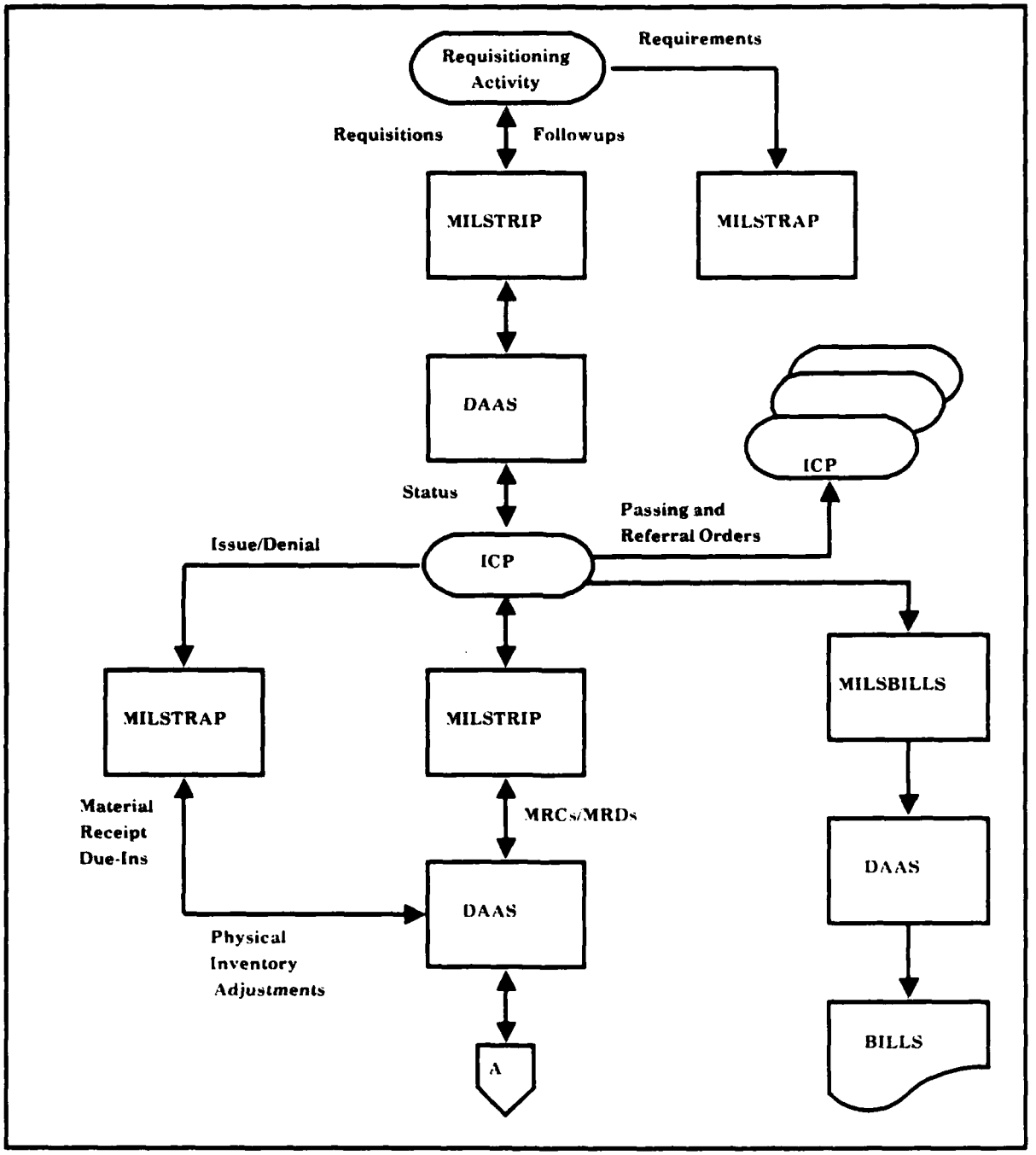
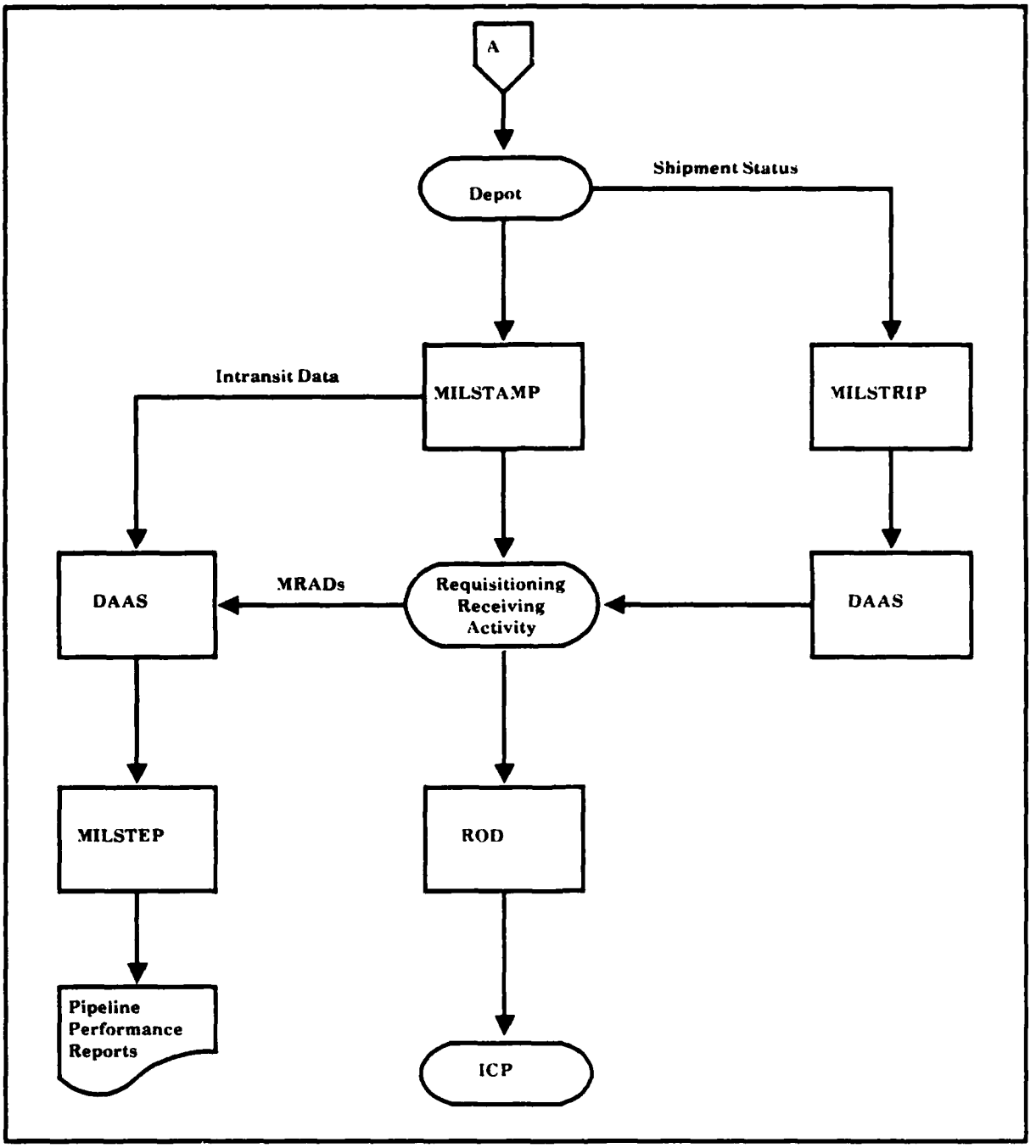


FIGURE 2-1. OVERVIEW OF THE REQUISITION FLOW (CONTINUED)



Communications between co-located ICPs and depots do not necessarily flow through DAAS. However, when direct ICP to depot communications do occur, copies of the transactions are transmitted to DAAS for recording.

When the MRO is received by the depot, the requisitioned materiel is obtained from the warehouse inventory, packed, and scheduled for shipment. Shipments destined for the same activity may be consolidated at the depot. When the DTS is used, the transportation control and movement document (TCMD), selection of mode, and consolidation of requisitions into shipment units are performed in the manner defined by MILSTAMP. When commercial shipping is used, MILSTAMP applications are utilized for data and documentation exchange. MILSTAMP also provides MILSTEP intransit data reporting requirements that are used to evaluate shipper and transportation performance. Shipping discrepancies are reported on a Transportation Discrepancy Report, that includes overages, shortages, damages, astray freight, and marking and packing errors. Automation of data collection and reporting is under development.

If the receiving organization notes discrepancies between what was requisitioned and what was received, the discrepancies are manually reported in accordance with the requirements of ROD. The types of discrepancies covered by ROD include incorrect quantity, improper packaging, wrong item shipped, and expired shelf life of the shipped materiel among others. ROD also covers complaints concerning Foreign Military Sales (FMS). This system does not require the electronic transmission of data.

Billing for the shipped materiel is initiated by the ICP which manages the requisitioned item. Billing is performed in accordance with the requirements of MILSBILLS. Interfund bills are automatically transmitted from the ICP through DAAS to the accounting activity of the requisitioning agency (billed office) based on a drop in inventory level.

FMS materiel are invoiced (billed) based on actual delivery to the carrier. Bills are transmitted through DAAS to SAAC or the Navy International Logistics Control Office for centralized billing.

Inventory Maintenance

An important element of the logistics process is the forecasting, maintenance, and control of depot inventories. MILSTRAP is the main DLSS that defines this process. One of the primary functions defined by MILSTRAP is accountability for and reconciliation of records between the ICPs and the depots.

Other functions of MILSTRAP include definition of procedures for inventory transaction reporting, inventory accounting transactions, physical inventory control, logistic reassignments (such as changes in item manager assignments), and requirements planning.

Evaluation Procedures

The performance of the overall logistics pipeline is evaluated in accordance with the procedures defined by MILSTEP MILSTEP records are maintained by the DAASO in Tracy, California. These records are based on inputs of supply history data supplied by Service/Agency MILSTEP processing points. Materiel Receipt Acknowledgment Data and intransit data cards are provided by the customer, and additional intransit data is provided by MAC and MTMC.

This data flow permits an overall evaluation of the logistics processing times (e.g., days for shipment) for each segment in the pipeline, and provides supply availability information showing ICP performance in critical areas.

The Procurement Process

This is the process by which materiel gets to the depots from the contractors selected by the procurement group of the ICP responsible for managing the item being purchased. The process is initiated by the item manager at the ICP, who identifies the level of the requirement based on system-generated forecasts developed using MILSTRAP and historical data related to the rate of depletion of the item. A purchasing agent at the ICP prepares either a purchase order or a contract for the amounts specified by the item manager.

An abstract of the contract is sent to the Administrative Contracting Officer (ACO) who is responsible for direct interface with the contractor providing the item. The ACO provides revised delivery forecasts, contract information (including contract modifications), and contract completion

notices to the ICP's. MILSCAP is used for the definition of formats and procedures. Similarly, MILSCAP defines the processes for contractor payments and for alerting the depots regarding shipment of the materiel.

If a requisitioned item is not in stock at a depot, direct shipment from the contractor to the requisitioning organization may occur. In this case, MILSCAP defines the procedure for the ACO to provide the ICP with direct notification of the shipment status.

FUNCTIONAL DESCRIPTIONS OF THE DLSS

The following is a brief description of the 14 DLSS. The descriptions include the chief objective of the standard system, its users, the major documents encoded into the standardized formats, and the logistics management activities excluded from the standardization procedures.

Military Standard Requisitioning and Issue Procedures (MILSTRIP)

The Military Standard Requisitioning and Issue Procedures, implemented in 1962, is the conceptual base of the Defense Logistics Standard Systems. MILSTRIP defines the requisition, issue, receipt, return, and redistribution of materiels. It governs the military supply system whereby facilities and installations at both wholesale and retail levels receive, store, maintain, distribute, and control the flow of materiel between the point of receipt and the point of issue. MILSTRIP standards are used by all Service requisitioners authorized to request supply support from any supply distribution system, including requisitions to GSA. Defense contractors also use MILSTRIP (when authorized by a contract) to requisition or move Government materiel. Civilian agencies authorized by supply support agreements to requisition from military sources conform to MILSTRIP standards by applying Federal Standard Requisitioning and Issue Procedures (FEDSTRIP) requirements. Foreign-country requisitions within the FMS and Military Assistance Grant Aid Programs are also included.

Major MILSTRIP documents used as both inputs and outputs include: (1) the requisition document from the original user, specifying the materiel needed; (2) the materiel release order document issued by a controlling supply manager (usually an ICP) to a storage site, directing release of the requisitioned materiel; (3) the materiel release confirmation document from the storage site

notifying the controlling supply manager of item availability in response to the materiel release order; or, alternatively, (4) the materiel release denial document from the storage site, notifying the controlling supply manager of lack of sufficient inventory to satisfy the materiel release order; (5) the referral order from a controlling supply manager of a requisition that could not be filled to another source which may have stock available; and (6) the redistribution order from an ICP to order stock to be moved from one location to another.

Other documents are: (1) follow-up, modify, and cancel the initial requisition document, (2) determine action on unfilled portions of partially filled or unfilled requisitions using the materiel obligation validation request and response documents, (3) direct the transfer of materiel to disposal, and (4) direct the return of excess materiel back to the source of supply.

Major requisitioning exceptions to MILSTRIP include bulk petroleum, coal, coke, forms and publications, and communications security equipment.

Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP)

The Military Standard Transaction Reporting and Accounting Procedures were implemented in 1965 to standardize the procedures and instructions for recording inventory management data. The inventory accounting objectives of MILSTRAP apply to information that is exchanged between an ICP and storage activity or location in performing supply and financial management actions. MILSTRAP defines:

- Controls for maintaining inventory balances during the issue, receipt, and return of materiel processing
- Performance goals for depot operations
- Inventory control effectiveness reporting
- Materiel location surveys and reconciliations
- Research requirements for potential and actual inventory discrepancies
- Processing time standards for materiel handling
- Asset status reporting
- Small arms serial number registration and reporting.

MILSTRAP's financial accounting objectives pertain only to the financial data produced as a by-product of materiel receipt, issue, and adjustment processing. MILSTRAP procedures enable the classification of inventories in terms of type of issue, receipt, and adjustments.

The accountable record defined by MILSTRAP is a primary source of recorded data for inventory control, supply distribution, and financial management decisions and actions. It contains data entries that indicate the ownership, purpose, condition, location, balances on hand, due-in or on backorder. Requisitioning and issue data conveyed by MILSTRIP transactions are used along with MILSTRAP transactions to produce inventory accounting reports. MILSTRAP procedures enable the automatic accumulation of related financial data as the accountable record is updated. MILSTRAP makes use of many transaction elements and codes originating in MILSTRAP, as well as patterning its procedures after those of MILSTRIP. Thus, the completeness of MILSTRAP records are dependent upon MILSTRIP data.

The process called "inventory segmentation" derives stock balance information by dividing the inventory of an item into meaningful categories having distinctive characteristics. The inventory control system is based on the concept of inventory segmentation by ownership, purpose, condition, and location. The system is designed to account for items of supply controlled, managed, or stocked in the DoD supply system. MILSTRAP codes provide this capability and enable ICPs to perform activities appropriate to the type of inventory being managed. These codes, recorded on the accountable record, are: (1) ownership codes as a means of segmenting inventory balances that are accounted for on a Service's or agency's accountable records but are owned by another; (2) purpose codes as a way for the materiel's owner to identify the reason an inventory balance is reserved; (3) federal condition codes for classifying materiel as to degree of serviceability and completeness in terms of readiness for issue and use and for use by disposal to classify materiel at time of receipt; and (4) management codes that allow supplemental data for information not provided via the other transaction coding structures.

MILSTRAP also defines the procedure to process materiel issue transaction information from a storage activity to an ICP. This procedure updates the accountable record, records appropriate

financial transactions and provides a basis for billing the customer. The procedure includes processing points receiving MILSTRIP requisitions, passing actions, follow-ups, and cancellations An important document used in this process is the MILSTRIP-defined Single Line Item Requisition System Document, DD Form 1348.

MILSTRAP prescribes the procedures for transmitting data related to materiel receipts between ICPs and storage activities. Materiel receipt and due-in transaction documentation from the storage activity is required to update the accountable record. MILSTRAP defines correction and update procedures for catalog change actions, improperly identified materiels, and adjustment transactions for discrepancies disclosed by physical inventory actions.

Physical inventory procedures are defined by MILSTRAP to reconcile inventory records with actual stocks. The frequency of counting stocks varies by nature of the item and includes minimum annual fiscal year counts, random sampling, and selective counts based on greatest significance criteria. For special programs or projects of a nonrepetitive nature for which ICPs cannot forecast demand, MILSTRAP provides procedures for forecasting demand of these items.

Major items excluded from MILSTRAP procedures are perishable subsistence items and brand name resale items, bulk petroleum, forms and publications, industrial plant equipment, secure telecommunications and signal intelligence equipment, aircraft and ballistic missiles, nuclear ordnance items designated by the Defense Nuclear Agency for item serial number control, and coal and coke. Financial transactions generated independently of accountable record maintenance are also excluded.

Military Standard Transportation and Movement Procedures (MILSTAMP)

The Military Standard Transportation and Movement Procedures were implemented in 1963 to manage and control the distribution activities of the DoD logistics system. Materiel moves through both the commercial carrier network and the Defense Transportation System. MILSTAMP applies to shipments of materiel NAF merchandise and personal property moving in support of military forces, and to shipments for nondefense agencies sponsored by Services. MILSTAMP also applies to FMS and Military Assistance Program Grant Aid shipments moving through military

terminal facilities and/or on MAC/MSC controlled or arranged transportation resources. However, much of the cargo moving under MILSTAMP is directed by a non-DLSS system (e.g., personal property, commissary and exchange merchandise).

MILSTAMP prescribes the policies and procedures required to manage and control the movement of materiel to and through the Defense Transportation System (DTS). MILSTAMP:

- Complements the policies and movement criteria of the Uniform Material Movement and Issue Priority System (UMMIPS)
- Establishes responsibilities of shipping, clearance, terminal, and receiving activities
- Establishes standard data and documentation procedures, data elements, formats, and codes
- Provides advance information to optimize use of transportation assets
- Provides intransit data to evaluate transit time and carrier performance
- Interfaces with other transportation and logistics systems.

MILSTAMP's primary objective is to establish a uniform language to facilitate the exchange of logistics data between the Services and Agencies. MILSTAMP provides detailed policies and procedures essential to transportation processes.

Basic MILSTAMP data is used for planning, coordinating, moving, and controlling shipments to, from, and within the DTS and interfacing with the MILSTRIP and MILSTEP systems. MILSTAMP data normally passed electronically include: Transportation Control and Movement Document (TCMD), the Cargo Manifest, and the Intransit Data Format/Card. The military shipment label or tag is the primary hard copy document required on all shipments by MILSTAMP. In addition, on seavan movements to commercial ports, a hard copy manifest is prepared that goes on-board the ship. For dangerous/hazardous cargoes, a hard copy load list with special handling instructions is prepared. In these situations, a cargo traffic message (similar to a telegram) is sent in hard copy to the receiving port for cargo receipt planning.

The Transportation Control Number (TCN) identifies the materiel being shipped and makes it possible for that materiel to be controlled as a discrete unit from origin to ultimate consignee. TCNs are assigned to materiel being shipped as the materiels are aggregated into TCMDs

and prepared for movement in response to the MILSTRIP supply requisition document. In the event that a shipment unit identified by a TCN is split into partial shipment units or is shipped in more than one container during the transportation cycle, MILSTAMP provides partial and split shipment codes to be included in the TCN.

The TCMD is used to: (1) provide the clearance authority with advance information to plan and control cargo input into the DTS; (2) make information available to the transshipping activity so that cargo can be prepared for continued onward movement; (3) make information available for ocean and air manifests as well as other logistics management reports; and (4) function as a dock receipt, tally sheet, or highway bill. Shipping activities electronically transmit TCMDs to clearance authorities for subsequent shipment control and movement. Air and surface clearance authorities use advance TCMD (ATCMD) documents to provide advance notice of shipments, to plan for receipt of cargo, and to provide input for mechanically prepared cargo manifests.

MILSTAMP does not apply to materiel shipped in support of Government contractors on a commercial bill of lading, first destination shipments from contractor plants to Service or Agency customers when the complete movement does not enter the DTS, shipments of personal property within CONUS, bulk petroleum products, special assignment airlift missions, and annual resupply projects not entering the DTS.

Military Supply and Transportation Evaluation Procedures (MILSTEP)

Military Supply and Transportation Evaluation Procedures were implemented in 1968 to measure supply system performance and transportation effectiveness throughout DoD. Performances of the supply and transportation activities are measured using the issue and shipping document data of MILSTRIP and MILSTAMP.

The products of MILSTEP are used at ICPs, the headquarters of the Services, and the OSD. In addition, Services/Agency internal evaluation systems depend on data collected under MILSTEP. MILSTEP's objectives include: (1) measurement of supply and transportation performance against time standards, (2) analysis of the use of issue priorities and issue priority groups, (3) analysis of the transportation performance at each segment of the pipeline, and

(4) analysis of supply systems workloads and materiel availability. Also, specialized reports (e.g., MAC analysis) are provided for the Services and DLA.

Seven major processing segments are measured by MILSTEP: (1) requisition submission time, from the date of the requisition to the date of receipt by the initial wholesale source; (2) passing action time, from receipt of the requisition by the initial wholesale source to receipt by the "ultimate" wholesale supply source; (3) ICP availability time, the time it takes for the "ultimate" wholesale supply source to transmit a materiel release order to the depot storage site; (4) depot or storage site processing time, the time between transmission of the materiel release order and receipt of the materiel by the depot transportation officer; (5) transportation consolidation and CONUS intransit time, the time between the date when the materiel is available to the depot transportation officer and receipt of that materiel by the CONUS requisitioning installation or port of embarkation; (6) overseas shipment time, from receipt of the materiel at the port of embarkation to delivery of the shipment to the overseas consignee; and (7) receipt take-up time, from receipt of the materiel at the destination to the date when the materiel is recorded on the requisitioner's inventory records.

Major inputs into the MILSTEP system include transportation-related data from the Intransit Data Cards (IDC) (domestic shipments only), Receipt and Lift Tapes, and all supply demand documents created by or for the ICPs and recorded on the ICP MILSTRIP History Tapes. Major categories of MILSTEP analytical reports include: pipeline performance, supply availability and workload, response rate, and intransit time.

Transportation performance dictated by UMMIPS standards is measured by the IDC/Receipt and Lift data under the MILSTAMP system and the Materiel Receipt Acknowledgement and Discrepancy reporting system under MILSTRAP. The IDC is generated at the shipping activity with information about the shipment and is provided to the Central Data Collection Point (CDCP) at DAASO, Tracy, California. The domestic consignee, upon receipt of the shipment, keypunches, stamps, or writes the date on the card. The information is transmitted over AUTODIN to the CDCP (transmission by mail is done on an exception basis). Data required to measure and evaluate supplying activities at wholesale and retail levels are on the MILSTRIP history tapes containing

supply demand documents such as the MROs and MRCs. The CDCP prepares the output reports from these inputs.

MILSTEP procedures are not applicable to commodities that are excluded from MILSTRIP procedures, for example, on-base local issues of retail stocks, shipments of retail stocks originating at installations, FMS shipments to freight forwarders, inter-Service/DLA parcel post shipments and vendor shipments from commercial suppliers directly to customers.

Military Standard Contract Administration Procedures (MILSCAP)

The Military Standard Contract Administration Procedures were partially implemented in 1973; implementation of remaining segments continues in accordance with the MILSCAP implementation schedule coordinated by the DLSS Office. MILSCAP is used by purchasing offices, contract administration offices, and inventory managers to exchange contract-related information. Data is shared among contract administration points, purchasing offices, consignees, funding activities, and, to a limited degree, contractors.

MILSCAP affects the following contract administration procedures: (1) preparing contract and abstract data for data processing; (2) shipping of materiel; (3) alerting a consignee when inspection and acceptance at destination is required and prescribing the method for the consignee to indicate such action; (4) notifying accountable activities of expenditures made against contracted funds; and (5) providing updated information about shipping instructions, delivery forecasts, and contract closing conditions. Documents prescribed by MILSCAP are:

- Contract Abstract – used for a variety of purposes in purchasing offices, ICPs, and field contract administration offices. Abstracts are created for contracts, purchase orders, delivery orders, and calls. The abstract includes pertinent contract data. It helps to establish commitment and obligation records and supports workload planning. Follow-on actions to the abstracting operation can be accomplished through MILSCAP transactions. Follow-on actions include obtaining missing data and modifying/correcting contract information.

- Shipment Performance Report – sent to the purchasing office or the item/project manager to advise of individual shipments that have been made by the contractor against a specific contract.

- Destination Acceptance Report – used in the delivery phase of the contract administration process. Contractor payments are made or denied when the receiving activity submits a destination acceptance report to the CAO.

- Delivery Forecast Report – furnished to ICPs for the preparation of supply status information under MILSTRIP.

- Contract Payment Notice – reports payments made to contractors by the payment office after contractors' invoices and the necessary inspection/acceptance reports are validated. Notifies the financial managers of expenditures made against funds cited in the contract.

- Contract Completion Status – used to advise on the status of a contract that may still be open even after final deliveries, due to litigation, accounting for Government-furnished property, or other possible similar actions.

Basic ordering agreements, blanket purchase agreements, and indefinite delivery contracts are excluded from MILSCAP.

Report of Discrepancy (ROD) System

The Report of Discrepancy system was implemented in 1969 and defines a standard method to: (1) report and obtain replies to discrepancies in shipping and packaging, (2) perform corrective actions, (3) provide documentation to adjust property and financial inventory accounting records, (4) establish information for claims against contractors, and (5) notify shippers of discrepancies. ROD applies to all organizations participating in the shipping and receiving of materiel in the DoD and GSA supply systems. Handling of discrepancies for FMS and Grant Aid shipments is also included.

The significant document prescribed by ROD is the Standard Form, SF 364, Report of Discrepancy. The purpose of the SF 364 is for reporting the error to determine the cause of the discrepancies, effecting corrective action, and preventing recurrence. Extensive criteria for preparing and replying to a SF 364 are given by ROD.

ROD excludes shipping-type discrepancies found while materiel is in storage and discrepancies involving shipments or requisitions which cite nonappropriated funds. Billing and accounting adjustments for shipping-type discrepancies are covered by the Military Standard Billing System (MILSBILLS).

Military Standard Billing System (MILSBILLS)

The Military Standard Billing System was implemented in 1973 and provides the standard procedures and formats used in the DoD Interfund Billing System. Data elements, codes,

procedures, and documents used for billing and collecting payments for sales of materiel are prescribed. In addition to billing for sales of materiel, MILSBILLS includes: (1) billing for accessorial and service charges; (2) billing for credits for returns of materiel; (3) billing for retail loss allowances; (4) requests for adjustments; and (5) billing for transportation, handling, and marking surcharges for overseas shipments in support of GSA. The system applies to all DoD components and Federal agencies participating in the military supply system.

Interfund bills are notices of disbursement of billed office funds by the billing office. Generally, a billing will be prepared upon notification from an ICP that a shipment from stock reduced the inventory balance. Alternatively, when there is a direct delivery of materiel from a contractor and a notification of receipt of materiel by the customer or of shipment by vendor, billings will be initiated. In both cases, the billing office receives documentation indicating the drop in inventory balance or delivery of materiel. Procedures followed within the interfund billing system are:

- A billing office forwards an automated billing to a billed office.
- The billing office advises its central accounts office of the interfund transfers through which it has reimbursed itself for the bills paid on behalf of the billed office.
- The central accounts office reports the interfund transfer transactions to the U.S. Treasury and to the central office whose funds have been disbursed.
- The central office of the billed offices maintains a suspense file to ensure that its charges are cleared.
- The billed office clears the interfund disbursements by accepting the charges (the funds disbursed may be corrected at the time of acceptance) or taking action to have the billing office reverse the transfer.
- Erroneous bills discovered by a billing office are reversed and corrected charges included in a subsequent bill without awaiting customer requests for adjustments.
- When an ICP determines a requisition has been canceled and notifies the billing office, the billing office reverses the previous bill in the next billing cycle, except when there is materiel to be diverted back to stock in which case the bill is reversed upon receipt of the materiel.

MILSBILLS is not mandatory when the funds involved are Military Assistance Grant Aid or where only limited sales occur between DoD activities. The interfund billing system is not

used to bill non-DoD customers, individuals, nonappropriated fund activities, nor for major end items. Non-DoD suppliers, except GSA, may not use the interfund billing system to bill DoD customers. Bills outside of the DoD Interfund Billing System are paid by check and are usually for appropriations outside DoD.

DoD Activity Address Directory (DoDAAD)

The DoD Activity Address Directory system was established in 1962 as an address file. DoDAAD provides data elements, identification codes and clear-text addresses for DoD, Federal, and commercial activities. It is used by the other DLSS systems described in this section to designate addresses needed for requisitioning, marking, shipping, document preparation, billing, and other applications.

Military Assistance Program Address Directory (MAPAD)

The Military Assistance Program Address Directory system was established in 1967 as an address file. MAPAD provides clear-text addresses of foreign country representatives, freight forwarders, and customers within-country required for releasing FMS and Military Assistance Program Grant Aid shipments processed in accordance with MILSTRIP, as well as addresses required for forwarding related documentation.

The addresses in this directory are furnished by foreign governments. The MAPAD addresses are used by the other DLSS described in this section.

Military Standard Petroleum System (MILSPETS)

The Military Standard Petroleum System was implemented in 1978 as the basic reference for policy and procedures governing data elements, documentation, and information flow for the management of bulk petroleum products. The Services are the major users of this system. The management of bulk petroleum involves numerous interfaces among the DoD Components and DLA/DFSC.[9] MILSPETS was established as a commodity-oriented system to facilitate the

[9]Defense Fuel Supply Center.

coordination of these interfaces and the development of the Defense Fuels Automated Management System (DFAMS).

MILSPETS prescribes data, data elements, related codes, documents/forms, formats and procedures related thereto for uniformity in the interchange of petroleum information within/between the Services, other customers, and DLA. MILSPETS includes the above as they relate to procurement, contract administration, requisitioning, distribution, inventory management and accounting, storage, transportation, and billing.

To the maximum extent practical, MILSPETS procedures utilize standard data elements, codes and formats of the other DLSS. MILSPETS procedures relate to those of MILSTRIP, MILSTRAP, MILSTAMP, MILSCAP, ROD, and MILSBILLS. MILSPETS, however, has no direct interface with any DLSS system other than MILSBILLS. MILSPETS billing formats are identical with MILSBILLS formats for bulk petroleum.

DLA, through the DFSC, performs worldwide integrated materiel management of bulk petroleum products and operates the DFAMS in accordance with MILSPETS procedures. Services and agencies as customers provide requirements to DFSC, receive bulk petroleum logistic support, and perform inventory management of their own retail stocks.

DFSC receives requirements for bulk petroleum from customers, issues solicitations to industry, and awards supply contracts. Defense Fuel Region (DFR) Offices, which are field operating units of DFSC for specific geographic areas, receive the contracts along with distribution plans that designate supply sources and quantities for each customer. Source Identification and Ordering Authorization forms are issued by DFRs to suppliers and customers that enable customers to order and suppliers to ship the fuel. Suppliers are either DFSC supply contractors or Defense Fuel Support Points that store and distribute DLA-owned bulk petroleum.

Defense Automatic Addressing System (DAAS)

The Defense Automatic Addressing System was implemented in 1965 as the system for routing logistics data traffic and processing documents. DAAS is designed to use the communications capabilities provided by AUTODIN. DAAS is used by the logistics systems of all DoD components

and other Federal agencies. The system automatically routes DLSS documents with direct on-line connections to AUTODIN or by mail.

DAAS operates the MILSTEP Central Data Collection Point (CDCP) and maintains the following data base files: (1) Source of Supply and Federal Supply Class, (2) DoDAAD, (3) MAPAD, and (4) DoD Routing Identifier and Distribution Codes. Additionally, DAAS operates the Defense European and Pacific Redistribution Activity (DEPRA), performs as an automatic mail system, edits data on requisitions, processes interfund billing documents, and furnishes copies of logistics documents to various Services logistics information files. DAAS also provides a selective Logistics Information Data System (LIDS), DD-MIL(M)1113, to the Services and other Federal organizations.

Logistics Data Element Standardization and Management Program (LOGDESMAP)

The Logistics Data Element Standardization and Management Program was implemented in 1975 as a common base of standard logistics data elements for use throughout DoD logistics systems. LOGDESMAP provides a Logistics Data Resource Management System (LOGDRMS) that publishes dictionaries and directories of all DoD logistics elements, as well as procedures for developing data elements. The LOGDESMAP manual contains four supplements: the logistics data element dictionary/directory; a list of document identifier codes; a compendium of logistics terms, acronyms, and abbreviations; and a user guide to the LOGDRMS system.

International Logistics Communications System (ILCS)

The International Logistics Communications System was developed and is operated by DAAS to provide a telecommunications capability for those activites which are not connected to AUTODIN. The ILCS is a dial-up communications network which allows subscribers to exchange logistics data with the DoD and civilian agencies. ILCS subscribers transmit logistics data to the DAAS where it is input to AUTODIN for transmission to DoD activities. Logistics data for ILCS subscribers is received through AUTODIN by DAAS where it is transmitted to the applicable ILCS subscribers. The ILCS is international in scope, being utilized by Security Assistance countries, freight forwarders, contractors, and DoD/Civil Agency activites.

3. AUTOMATED LOGISTICS SYSTEMS

To automate processing of logistics documents and recordkeeping, DLA and the Services develop, operate, and maintain extensive ADP systems. At present, these systems are configured to operate in a large-scale batch processing mode that support a limited on-line inquiry capability. However, DLA and the Services are actively involved in major logistics operation and management modernization efforts from ICP systems to unit-level supply systems. These modernization efforts are primarily driven by new hardware technologies. The new hardware increases processing speeds, expands storage capacity, and improves telecommunications capabilities. In most cases, modern processing techniques are used and include: (1) fourth generation high-level programming languages that increase system implementation/modification productivity; (2) relational data base management systems that improve logical views of data for storage, reduce data redundancies, and ease data retrieval for the user community; and (3) increased transaction processing speed making on-line, interactive processing practical. To obtain the many advantages offered by these new hardware and software technologies, the Services and DLA are acquiring new computers and software.

This section discusses both present systems and plans for implementing systems of DLA, the Military Services, and the Military Traffic Management Command (MTMC).

DLA SYSTEMS

DLA has implemented four automated systems in the standardization of logistics management procedures and programs. The first was the Standard Automated Materiel Management System (SAMMS), which is designed to provide uniform materiel management procedures throughout the agency. The second project, the Mechanization of Warehousing and Shipping Procedures (MOWASP), employs standardized data processing for storage depot operations and related warehousing and traffic management.

The third project is the Mechanization of Contract Administration Services (MOCAS). This DLA project provides computer-assisted data processing and retrieval to the complex sequence of

services which are provided by the Defense Contract Administration Service Regions (DCASR) and district offices to the buying offices, the item managers, and the industrial producers. The fourth project is the Base Operations Supply System (BOSS) used at the DLA specialized support points to account for, maintain, and issue DLA managed commodities.

Present DLA Systems

DLA's SAMMS is made up of five functionally oriented subsystems: requirements, procurement, distribution, financial, and technical. The system receives card image input data in prescribed DLSS formats from the AUTODIN, and from cards mailed in, mail messages, and on-line remote terminals. Controls for both item and financial accounting are effected through a standard routine used by all subsystems. Integrity of files and control of information flows are critical to successful operation of the system.

SAMMS performs the following functions:

- Maintenance of supply files including a supply control file, due-in details, requisitions, policies, and returns
- Calculations of inventory levels, review of reorder points, and posting of recommended buys
- Generation of quarterly forecasts for items
- Preparation of purchase requests from recommended buys
- Control of information related to transition from purchase requests to active contracts
- Maintenance of financial inventory, accounting, and control information
- Maintenance of data related to commitments, obligations, and payments
- Interfaces for users with the Defense Integrated Data System (DIDS) allowing users to access the DIDS files through SAMMS
- Response to interrogations related to DIDS data, and data files maintained by SAMMS
- Support for the provisioning process including processing of supply support requests (SSRs) from Services, advising customers, and controlling the addition of new items

Tables of data are used extensively to accommodate the diversity of items managed among the several DLA centers; for example, the Source Preference Table identifies the stock point

(depot) closest to the requisitioner. Since tables are modified frequently, they are maintained outside the programs. Transaction validation is performed by the entry/exit subsystem that receives the initial input. For example, a requisition is validated for assurance that the quantity is reasonable, that it is for an item managed by the receiving center, and that shipping and proper billing can be effected. Single-point validation insures acceptance by all applications or rejection prior to any processing.

The technical subsystem is responsible for item intelligence and supply management data. It is the link through which the supply centers communicate with the Defense Logistics Services Center (DLSC), the Services, and the customers. The principal file used is the total item record; it includes supply management data records. The ability to automatically substitute items (when the primary item is out of stock) is provided within the system through interchangeability and substitutability tables developed by the item managers or by automated input from the item standardization application in the technical subsystem.

In its distribution subsystem, SAMMS interfaces with the MOWASP system. Specific points of interface are in receipt processing, issues, physical inventory, followups, and locator file reconciliation.

The procurement subsystem provides for the computerized control and tracking of all procurement actions from the receipt of a purchase requirement to contract completion. The subsystem includes an Automated Small Purchase module that automatically issues calls against blanket purchase agreements, delivery-type contracts, and requests for quotations in competitive small purchase situations. In the automated request for quotation process, the system evaluates quotations received from industry, selects the best offer for award, and prints a purchase order for the awardee. Future improvements will provide on-line update and inquiry.

The financial subsystem performs funds control and accounting for all actions through the commitment, obligation, and expenditure phases of a procurement. Financial inventory control is maintained along with recording sales and replenishments. Customer billing is accomplished automatically each month, with collection from customers made through the interfund process.

Complete financial records and general ledger accounts are maintained in the system with statements and reports prepared according to a defined schedule. The financial subsystem furnishes the procurement subsystem funding data, by fund classification code. All transactions requiring funding are reviewed for availability of funds. Completed commitments/obligations transactions adjust appropriate general ledger accounts.

The DLA MOWASP system at DLA's depots and supply centers mechanizes materiel receipt processing, shipment planning, freight consolidation, shipment status, stock locator files, workload forecasting, and preparation and control of shipment documentation. The system provides a complete locator, freight data, and prepositioned materiel receipt file in random access storage mode permitting remote on-line processing. Materiel receipt processing results in a receiving form being produced at the remote terminal containing warehouse storage location and other pertinent data. Other actions may introduce new data into the system, update appropriate files, prepare receipt history, and forward confirmation automatically to the ICP into the SAMMS system.

DLA practices central asset accountability and all requisitions for DLA materiel are transmitted via DAAS to the appropriate defense supply center (ICP) for edit, validation, and processing. A materiel release order (MRO) is then transmitted to the selected storage point. At the depot, MROs are processed daily within standards of the UMMIPS. High-priority materiel MROs are processed several times daily and documents are created by MOWASP for the pick, pack, mark, and ship processes. Low-priority documents are held for optimum shipping consolidation; they are released in a daily routine based on transportation and shipment schedules to areas of destination.

MOCAS is the data system used by DCAS regions to provide operational data to assist in managing the many tasks associated with contract administration. The operational data are used to monitor contractors' delivery performance, pay contractors' invoices, and control the many facets of contract administration. Contract administration encompasses such functions as:

- Preaward surveys
- Production surveillance
- Expediting

- Inspection and acceptance of materiel
- Industrial security
- Payment actions.

These functions support the buying activities (and inventory managers) who award the contracts. Through MOCAS processing and applying MILSCAP standards, they receive notifications of shipments of goods, alerts to delinquent items, notice of contract payments, and periodic delivery status reports. After approval, mechanized reports of funds disbursed in payment of contracts are furnished to the accounting activities of the Services.

DLA Modernization Plans

It is critical that DLA operate modern systems if it is to efficiently manage the almost 2.5 million active items and process the 21 million requisitions per year for which it is responsible. For this reason, DLA is modernizing all hardware, communications, and software applications. SAMMS is in the early design phase; MOWASP is in the replacement phase. MOCAS is undergoing review and functional specification.

While SAMMS has already taken advantage of many modern data processing techniques, including on-line requisition-status inquiries, much remains to be done. Several problems remain because DLA systems are not fully integrated with each other and because the DLA network (DLANET) is becoming saturated. The modernized SAMMS system being planned is based on data base management system (DBMS) techniques and will include: (1) comprehensive weapon system management control, (2) demand data analysis, (3) full procurement request tracking, (4) automated award notification, (5) technical data on-line inquiry and maintenance, and (6) an on-line customer data complaint system. The SAMMS modernization will be performed in specifically defined increments and will take about 8 years to complete

The MOWASP system replacement is called DWASP (DLA Standard Warehousing and Shipping Automated System Program). DWASP began in 1978, when OSD authorized development of a standard automated system for warehousing and shipping for all of DoD. While the Services were reluctant to move towards a standard DoD system, DLA began its design of DWASP. The goal of

DWASP is to provide state-of-the-art automated hardware and software, with real-time processing and on-line inquiry capability. The completed system will:

- Track a transaction as it progresses through the system and pinpoint the individuals responsible at each processing point
- Call up information on an "as required" basis
- Select and ship materiel as soon as it arrives at the depot
- Assign specific storage locations to each new receipt, based on cube and weight, facilitating both the stow and selection processes
- Control conveyances, tracking them from the time they enter the gate to the time they leave the center.

The DLA Systems Analysis Center (DSAC-D) in Ogden, Utah, is responsible for developing the functional specifications, system design, and implementation and training. Because of DSAC-D's connection with the depot at Ogden, Utah, this depot is the test site for all depot system requirements. Phase I of DWASP has been implemented at Ogden, Utah, and is being implemented at other DLA depots. The schedule for the remaining DWASP modules implementation is still under discussion.

DAASO Modernization Plans

DAASO, the cornerstone of logistics information communications, is also planning for major modernization. While the current emphasis is on hardware replacement, new software and a data base management system will be integral components of the full modernization plan.

The DAASO modernization is based on a 50-megabyte-per-second hyperchannel architecture. This will connect several fourth generation computers in a distributed processing environment with appropriate levels of redundancy to provide on-line safety levels that will meet DAASO-critical mission requirements. The hardware at Dayton, Ohio, will be upgraded first, followed shortly thereafter by the Tracy, California hardware. The project is a five-phase effort, scheduled for completion by the end of 1989.

Phase I is complete and included installation of a Network System Corporation hyperchannel and replacement of obsolete tape drives with a Unit Record Support System. Phase II,

a continuation of hardware modernization, has begun and will be completed in 1987. This phase involves:

- Installing hyperchannel links
- Developing the DAASO Electronic Mail System
- Developing the DAASO Network Control System
- Developing the DAASO Information Management System.

Phase III covers the development and implementation of DAASO software with design and implementation of an Integrated File Management System/DBMS. This is scheduled for completion in 1988. Phase IV is the DAAS telecommunications system upgrade, with development of a new DAASO AUTODIN Control System-II. This capability, scheduled for completion in 1989, will integrate both the upgraded AUTODIN called IS-A/AMPE and the Defense Data Network (DDN) telecommunication systems. All elements of the modernization will be fully integrated and implemented at the Tracy site during Phase V, by the end of 1989.

At the conclusion of the DAASO modernization efforts, DAAS expects to have the capacity to satisfy the on-line, interactive inquiries expected to result from Service modernization efforts, to meet increased traffic flows resulting from expansion of logistics management requirements, and to respond to changing data requirements from a more dynamic logistics and weapons management environment.

ARMY SYSTEMS

There are five major systems in the Army's logistics management process as shown in Table 3-1. All are being modernized.

Existing Army Systems

The Logistics System Support Activity (LSSA) in Chambersburg, Pennsylvania, is a central systems design activity of the Army Materiel Command (AMC) responsible for the design, development, integration, programming, testing, documenting, installing, and maintenance of standard automated systems. An integral part of the total scope of its program is standard system applications for use by all AMC depots and other selected AMC activities. The major automated

TABLE 3-1. DEPARTMENT OF THE ARMY MAJOR LOGISTICS MANAGEMENT SYSTEMS

SUPPLY MANAGEMENT LEVEL	SYSTEM
Unit retail (post, camp, station)	Unit Level Logistics System (ULLS)
Direct support unit retail (company, battalion)	Standard Army Retail Supply System (SARSS)
Intermediate unit retail (division, corps)	Standard Army Intermediate Level System (SAILS)
Depot, wholesale level	Standard Depot System (SDS)
ICP, wholesale level (NICP/Major Subordinate Command)	Commodity Command Standard System (CCSS)

system in this category is the Standard Depot System (SDS). SDS consists of 17 applications divided into three basic subsystems: (1) Material Management System, (2) Production and Equipment Management System, and (3) Financial and Personnel Management System. These subsystems cover the entire scope of depot functions, including: processing receipts, requisitions, denials, adjustments, preservation packing, storing, inventory, workload planning, collecting engineering capability data, quality assurance, work orders modification, financial management, and personnel actions.

The Automated Logistics Management Activity (ALMSA) is located at St. Louis, Missouri. It is a central system design activity of AMC, responsible for standard automated systems and equipment for AMC major subordinate and research and development commands. It serves as the AMC focal point for advanced computer technology and techniques, teleconferencing, office automation, and information resource management. ALMSA developed and maintains one of the largest business and accounting systems in the Army, the Commodity Command Standard System (CCSS). CCSS is a fully operational wholesale logistics system. It provides automated support to the Major Subordinate Commands in provisioning, cataloging, security assistance, supply management, procurement and production, financial management, maintenance, stock control, traffic management, and quality assurance. It includes automated interfaces with depot operations and other Army, DoD, and GSA systems over AUTODIN communication lines.

The Logistics Control Activity (LCA), at the Presidio of San Francisco, California, provides by way of the Logistics Intelligence File (LIF) visibility on individual requisitions and shipments as they are processed throughout the Army's and DoD's logistics pipeline. The LIF is a centralized computer data base containing supply and transportation data on Army-sponsored requisitions submitted to the wholesale supply system. The LCA provides: 1) inquiry-response services to its customers for near real-time supply and transportation status, 2) logistics management reports to activities from the supply support activity level to Army Headquarters and (3) notifications of point of entry arrivals and lift dates from MTMC terminals. LCA also has visibility of Reports of Discrepancy (ROD) and Military Standard Billing System (MILSBILLS) data through MILSTRIP/ MILSTAMP transactions. The LIF, however, does not contain a record of ROD or MILSBILLS transactions. Inquiries are made by telephone to LIF operators on duty 24 hours a day: who respond using on-line (direct dial, AUTODIN, and ARPANET[1]) terminals. The LIF can accommodate 80 document numbers at a time. Each request must include, at a minimum, the requisition document number or the TCN. The LIF system processes over 225,000 inquiry transactions per month.

The remaining three systems support retail activities in the Army. The Unit Level Logistics System (ULLS) provides automation of Class 9 supply and the Army Maintenance Management System at the unit level. The Standard Army Retail Supply System (SARSS) is intended to automate most manual supply operation functions used in Army divisional and nondivisional direct support units. The Standard Army Intermediate Level System (SAILS) continuously balances the assets on hand and on order for an item of supply against the demand for that item through a set of computations, reports, and evaluations.

Army Modernization Plans

All five of the Army's primary logistics systems are being modernized. The Army plans to improve the SDS through hardware improvement, the incorporation of bar code technology, and the design of new functional applications. Modernization efforts will span the next 3-to-5 year period

[1]Advanced Research Projects Agency Network.

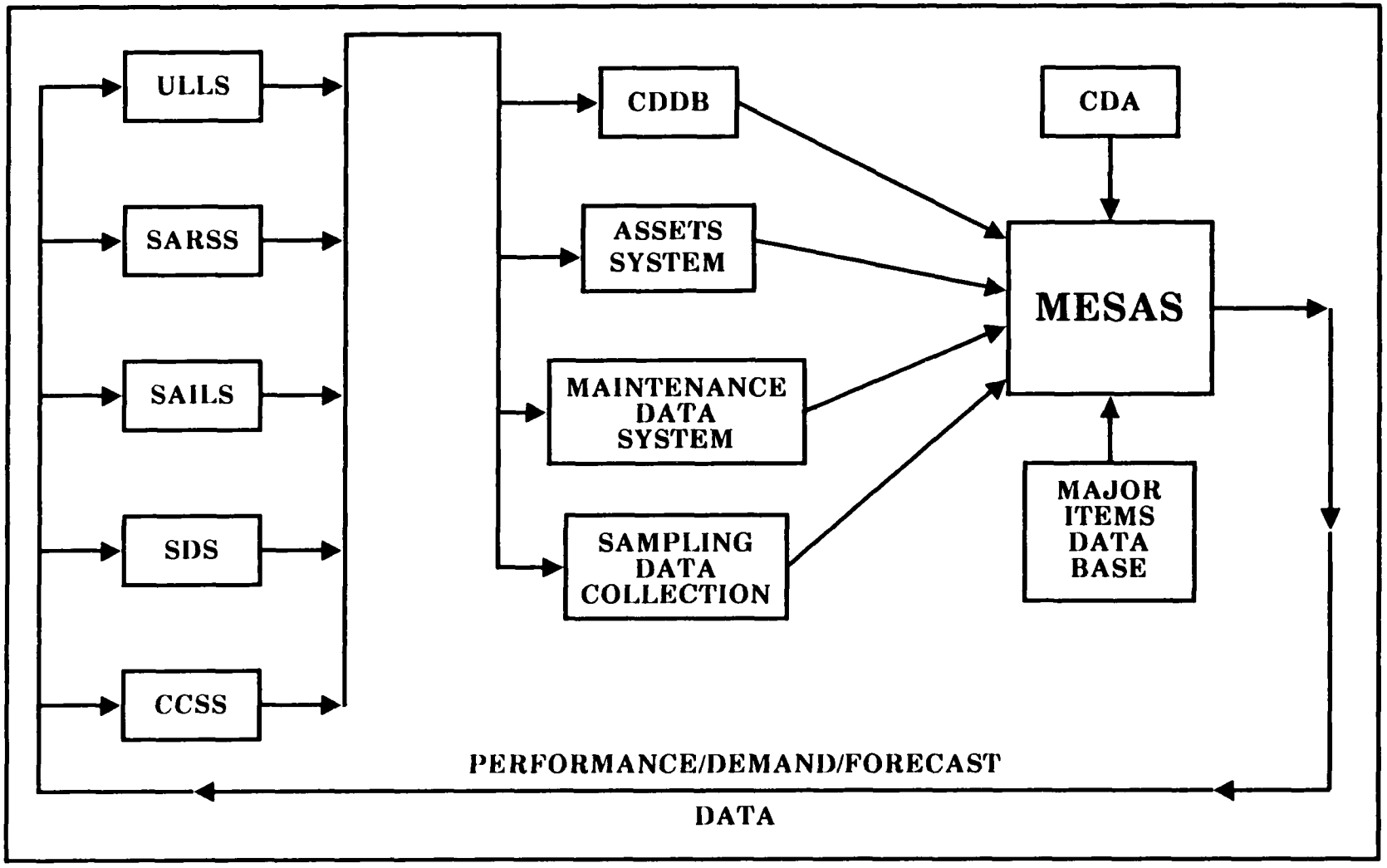
ULLS operates out of a mobile supply van and is in prototype test at several units. The system operates using an enhanced Radio Shack TRS-80 microcomputer that stores a complete listing of the van's inventory. When a user enters the van with a parts request, the request is either immediately filled, which reduces the inventory, or is put on backorder, which automatically generates a unit-level requisition containing a three-position end-item code that identifies the end-item equipment by type and model. ULLS data is regularly sent (using floppy disks) to the SARSS system for inventory updates and generation of MILSTRIP documents for transmission into the wholesale requisition system. An important aspect of this modernized system is the Department of Army (DA) Form 2765 unit-level requisition. It will capture weapon system type and model information. The DA Form 2765 will be transmitted, through DAAS, to the Central Demand Data Base (CDDB) being developed at the LCA, Presidio, San Francisco. The information will then enter a system now in design, known as the Multi-Echelon Stockage Analysis System (MESAS). A conceptual diagram of the MESAS system is shown in Figure 3-1. Communications for MESAS from the retail-level upward will be accomplished by the Vertical Installation Automation Baseline (VIABLE) system and its regional data centers – the beginning of an Army "corporate" network.

SARSS, at the Direct Support Unit level, is being redesigned to improve processing time using data base techniques for real-time processing. This will also improve the capability of the system to accommodate DLSS changes in the future. All systems are being modified to accommodate the automatic flow of DLSS record images between systems. Above the direct support unit level, SARSS will replace the Direct Supply 4 (DS4) and the SAILS in the automation of supply management functions performed at the separate brigade, division, corps, installation, theater, and major command levels.

Future directions and modernization efforts of CCSS will incorporate changes in its functional, computer hardware, and data-handling techniques and enable on-line, real-time requisition processing.

Modernization of the LIF is focusing on hardware replacement. The LIF recently reached sustained processing levels approaching 85-percent capacity. Therefore, LCA is procuring

FIGURE 3-1. MULTIPLE ECHELON STOCKAGE ANALYSIS SYSTEM CONCEPTUAL DESIGN



newer, more powerful hardware to support the LIF and other data bases currently in the development stage.

AIR FORCE SYSTEMS

Automation of logistics management procedures in the Air Force is extensive. More than 300 different systems are currently maintained by the Air Force Logistics Command (AFLC), the Air Force Data Systems Design Office, and the various Major Command data automation functions.

Present Air Force Systems

Operation of the Air Force logistics system is divided into two levels: base and depot. The base level, also called the retail level, provides logistics support to all operational units (flying wings, communications squadrons, civil engineering squadrons, etc.) at a particular location. This base-level system exists at 130 Air Force bases worldwide. Each base belongs to one of the 13 Air Force Major Commands responsible for supervising the base level operations. The depot level, also called the wholesale level, supports the base level logistics system. Air Force depots are operated by the AFLC. The depot level provides weapon systems management, centralized purchase and control of assets, overhaul and maintenance, and Air Force-wide visibility of logistics support.

Base-level automation of logistics systems is accomplished by the Air Force Standard Information Systems Center (SISC). Its responsibility is to develop and maintain standard Air Force logistics software. These systems include the Standard Base Supply System (SBSS), the Vehicle Inventory Management System, and the Base Level Transportation System.

The automation of depot-level logistics systems is accomplished by AFLC's Logistics Management Systems Center (LMSC). LMSC is responsible for over 100 systems that support all facets of depot operations. Notable among these are the Inventory Manager's Stock Control and Distribution System, Shipment Document Release and Control System, and the Retail Stock and Control System.

While these two organizations develop and maintain most Air Force logistics systems, each Major Command also maintains a data automation function to provide specialized systems to

meet unique requirements. These systems are small and specialized, and normally use one of the standard base-level systems as a source of data.

Most Air Force logistics systems (base-level standard, depot level, or Major Command unique) share three characteristics. First, they are batch operations resulting in slow information processing time. Second, they were developed in the late 1960's and early 1970's and little modernization other than changes to accommodate DoD procedure changes has occurred. Third, they are designed for autonomous operations. The interfaces that do exist between systems are defined mostly by the various DLSS.

Air Force Modernization Plans

Recognizing these deficiencies, the Air Force is undertaking a large modernization program. The master plan for a modern Air Force logistics systems infrastructure is being developed by the Logistics Information Management Support System (LIMSS). The goal of LIMSS is to provide a logistics systems architecture with the capability to integrate the various information systems. To support the LIMSS effort, both SISC and LMSC have ongoing major modernization efforts. For the base-level systems, SISC is completing a hardware replacement program, replacing Sperry-Univac 1050-II and Burroughs B3500 computers with Sperry 1100/60 series computers. Additionally, the following efforts will significantly improve base-level logistics support:

- Connection of the base-level system to the Defense Data Network (DDN)
- Optimization of the Standard Base Supply System (SBSS)
- Development of on-line systems for the base-level transportation function.

These programs are planned for completion by 1989.

LMSC is managing the depot-level systems modernization program. This program is divided into two activities. The first is to modernize current software systems. To accomplish this, AFLC is developing 13 major on-line systems, to replace over 100 batch systems. The two major systems in this category are the Stock Control and Distribution System (SC&D) and the Requirements Data Bank (RDB). The SC&D will replace 23 current systems and provide real-time management of AFLC's depot supply stock. It will have a major interface with the base-level SBSS.

SC&D is scheduled for completion in 1989. The RDB will consolidate the functions of 21 different current systems and provide a single information source on all supply requirements and buy decisions.

The second major LMSC modernization activity is called Logistics Network (LOGNET). This program provides a modernized communications network between AFLC systems. LOGNET has three major subsystems. The first is a local area network (LAN) at AFLC headquarters and each of the Air Logistics Centers. The LAN will initially be broad-band coax cable, with later expansion involving twisted pair baseland cables for office automation systems and fiber optic cable for major trunk lines. The second subsystem is intersite gateways, connecting the LANs to DDN, AUTODIN, and other long distance communication channels. The third subsystem is intelligent gateway processors (IGPs). IGPs are designed to allow user terminals to access different AFLC systems without a need to know the peculiarities of each system. The IGPs serve as a simplified information access manager.

The Major Commands also have ongoing modernization plans. The most significant is the Military Airlift Command (MAC). To improve visibility and control of logistics assets being transported by MAC, it is developing a Centralized Aerial Port System. This system consists of a real-time cargo management subsystem and a passenger management subsystem. The system will enable MAC to ascertain within minutes where assets and passengers are in the MAC transportation system. This modernization represents a quantum improvement over current systems, that have a 6-hour lag between movement and management visibility.

NAVY SYSTEMS

The Navy logistics systems are being modernized to reflect increased requirements and changes in the state of the art of computer hardware and software.

Existing Navy Systems

In 1961, the Naval Supply Systems Command adopted a three-phase master plan to develop a Uniform Automated Data Processing System for:

- Stock points

- Inventory control points
- Shipboard supply management.

Development of the Uniform Automated Data Processing for Stock Points commenced in 1961, and the first pilot installation was made at the Naval Supply Depot, Newport, Rhode Island, in 1963. Since then, the system has been implemented in all major Navy stock supply centers, industrial Naval air stations, level II Naval air stations, and Naval shipyards. The primary functions of the Stock Points' system are requisition processing, material movement control, receipt processing, and physical and financial inventory control.

The second phase of the master plan was development and implementation of the Uniform Automated Data Processing System for Inventory Control Points. This uniform system provides for:

- Stockage of items at stock control points where future demand is most likely to occur
- Daily transaction reporting and stock status reconciliation
- Near real-time processing of requisitions
- Rapid response by ICPs to requisitions for items not in stock, resulting in "fill," "kill," or "pass" actions
- Central maintenance of backorders.

Currently, subsystems for requisition processing, item transaction reporting, supply demand review, purchase stratification, disposal, accrual accounting, weapons system management, and cataloging are fully implemented at the two Navy ICPs.

The newest of the three uniform systems, Shipboard Supply Management, provides tenders, repair ships, carriers, and Marine air groups with completely automated supply and accounting systems. Its objective is effective control over shipboard inventory and financial management. Some characteristics of the system are:

- A master stock record to maintain all pertinent data for an item
- Full integration of supply and accounting to ensure that financial records and controls are in agreement with the inventory records
- Improved management reporting, indicating supply performance activity and areas of trouble where management attention is required.

Navy Modernization Plans

The Navy logistics community has a full range of modernization efforts in progress including:

- ICP Resolicitation
- Stock Point ADP Replacement (SPAR)
- Shipboard Non-tactical ADP Program (SNAP)
- Stock Point Logistic Integrated Communications Environment (SPLICE).

The ICP Resolicitation is a $350 million project to replace computers at the Aviation Supply Office (ASO) and the Ship Parts Control Center (SPCC) with newer hardware and software systems capable of responding to the Navy's logistics requirements for the next 20 to 25 years. The project will replace 16 large third-generation Sperry-Univac and International Business Machines Corporation (IBM) computers, convert over 4,700 programs, and resystemize all ICP functions. The ICP Resolicitation includes implementation of on-line data bases, real-time maintenance of data, source data automation, reduced hard copy output, and distributed processing, where appropriate. The new system will perform two main functions:

- Weapons System Management
  - Program support
  - Provisioning
  - Configuration status accounting
  - Allowance determination
- Supply Management
  - Cataloging
  - Budgeting and accounting
  - Requirements determination
  - Purchasing
  - Inventory management

- Repair management
- Supply transaction processing.

Planning for the ICP Resolicitation Project began in 1975. The functional system specifications have been prepared and the acquisition process begun. An important aspect of the acquisition was the concept that one vendor would provide the hardware, system design specifications, full system integration, and operation over a period of approximately 24 years. The system development contract award was made to Electronic Data Systems in February 1984. The first phase of the project is to convert all systems to a DBMS, planned for completion in March 1987. The second phase of the project, extending into the 1990's, will be redesign and programming of the existing COBOL programs using high-level fourth generation technologies. The major portion of the system, the Uniform Inventory Control Program, encompasses DLSS standards and processing procedures and will be implemented in early 1989.

The SPAR project was begun in 1981 with the purpose of replacing all stock point computers and modernizing the Uniform Automated Data Processing System – Stock Points systems. It will replace over 75 medium-scale Burroughs computers and will convert more than 7,000 programs which support the Navy's major logistics management systems for the fleet, including:

- Physical Distribution
  - Material receiving
  - Material storage
  - Storage management
  - Material issue
  - Material packing
  - Material movement
  - Post/terminal services
- Inventory Management
  - Establishment of stock levels

- Determination of requirements
- Customer services
- Technical support
- Repair management
- Stock record management
- Management of weapon systems support.

The project will include modernization of the Navy's Regional Contract Centers purchasing and contracting systems.

The SPAR project is now in the procurement and benchmark phase of development. Contract award is expected about January 1987. The hardware and software deployment is scheduled to begin in early 1990 and to be complete by the end of 1992

The SNAP program is designed to bring real-time management information systems (including logistics management) capabilities to all Navy ships. Using commercially available hardware and software, the systems will collect, maintain, analyze, and report on shipboard nontactical activities. The system will include real-time, on-line access to weapons systems related files on-board and will interface, via satellite, with shore-based logistics management systems.

The SNAP program is a two-phase effort, SNAP-1 and SNAP-2. SNAP-1 will improve the automated processing capabilities of the fleet's larger ships (e.g., tenders, combat stores ships), increasing their ability to meet the supply needs of combat ships. SNAP-2 will bring automated "nontactical" capability to the combat fleet (e.g., battleships, cruisers) and specialized ships (e.g., replenishment oilers). While these ships have had automation for many years, it has been devoted entirely to operational needs.

The SNAP program is an 11-step process of hardware acquisition, systems design/implementation, and on-board implementation and integration. Four steps in the process have been completed and the remaining seven steps are scheduled for completion over the next several years.

The SPLICE program objectives are to provide Navy stock points with highly reliable computer systems that offer state-of-the-art on-line transaction processing capacity and ADP telecommunications support. The functional areas to benefit from these improved capabilities include: financial accounting, receiving, material movement, procurement, and reparables management.

The Navy is obtaining computer hardware upgrades for 62 SPLICE sites. The hardware features TANDEM Corporation TXP computers providing inter-processing subsystem networks of as many as 14 clusters connected by fiber optic extensions. Each TXP can handle inputs and outputs to several heterogeneous subsystems, because of their specialized hardware protocol converter capabilities. These inter-processing subsystem networks are then connected on a LAN with an NSC hyperchannel providing a network of systems. The LANs will in turn be interfaced via DDN with a Navy-wide SPLICE network (SPLICENET), providing rapid, Service-wide access to logistics status information. From a user's viewpoint, the multiple-level networking will provide timely data through on-line access and permit the sharing of vital inventory and shipping data across stock points.

The SPLICE program for improving hardware and software is scheduled for completion in 1987, in time to interface with and provide the necessary capabilities for implementing the SPAR program modernization described above. The benefits of the SPLICE program are:

- Capacity relief
- Faster response
- Higher productivity
- Greater access to supply data
- Greater capacity for fleet support.

The combination of these four Navy modernization programs will provide the Navy with a highly sophisticated, integrated set of systems that have the capacity and flexibility to meet future needs for logistics management information

MARINE CORPS SYSTEMS

The Marine Corps systems are designed to support a single ICP and two remote storage activities. In addition, they emphasize rapid deployment of material and front-line requisitioning.

Present Marine Corps Systems

The Marine Corps Unified Material Management System (MCMMS) is an automated, integrated system at a single ICP and two remote storage activities. MCMMS is composed of 15 interrelated subsystems that process on third-generation computers. These subsystems are:

- Inventory control
- Stores accounting
- Controlled item management
- Procurement
- Allotment accounting
- Technical data management
- Applications
- Provisioning
- War reserve
- Stratification
- Special program
- Supply management information
- Direct support stock control
- Warehousing and shipment processing
- Data element control.

One particular subsystem is of special note, the Direct Support Stock Control subsystem. At Marine Corps bases, where tenant Fleet Marine Force activities normally are located, the base operates a direct support stock control. The accounts within this subsystem are: (1) self-service centers, shop stores; (2) retail clothing outlets; (3) subsistence accounts; (4) commissary stores, and (5) petroleum, oils, and lubricants accounts. The subsystem is designed to record and accumulate all

data required for routing, recordkeeping, requisitioning, and reporting to the ICP and the stores accounting subsystem. The ICP accounts for the direct support stock materials by dollar value only. Customers obtain materials from the issue points by informal demand, and stocks are replenished by formal requisitions submitted to the ICP integrated material manager or from local procurement. The base maintains all necessary records, receipts, issues, adjustments, and change transactions and sends item/financial summaries to the ICP weekly. Quarterly status reports of issue point item assets are produced for reconciliation with ICP records.

Marine Corps Modernization Plans

The Marine Corps has progressed the farthest in its systems modernization project. The objectives of the Marine Corps Standard Supply System project, called M3S, are:

- Forty-percent reduction in printed output
- Real-time, interactive inquiry
- Twenty- percent reduction in supply, fiscal, and maintenance personnel training requirements
- Elimination or control of data redundancy
- Integration with the financial management system – Standard Accounting/ Budgeting Recording System
- Reduction of the effect of DoD-directed changes (including DLSSs procedures and policy changes).

All of the major Marine Corps logistics management systems are being replaced by M3S and integrated as a single logistics management system. The supply systems being replaced include:

- MUMMS – Marine Corps Unified Material Management System
- DSSC – Direct Support Stock Control
- SASSY – Supported Activities Supply System
- Base Property Control Office Systems.

Like the other Services, the Marine Corps relies heavily upon commercial contractors for expertise and experience through a large-scale integration support contract. The Marine Corps system development is a 10-phase project that began in 1976. As of June 1985, the integration

support contract has been awarded and Phase I and II completed (I – establish the M3S standard data structure, and II – convert SASSY/DSSC to a DBMS at the retail level). The remainder of the project is progressing and is planned for completion in the next few years.

DEFENSE TRANSPORTATION SYSTEM

MILSTAMP is the DLSS procedure that most directly affects the Defense transportation system. MILSTAMP focuses on standardizing shipping procedures for international traffic among MTMC, MSC, and MAC. MTMC has a number of modernization projects related to MILSTAMP in progress. Most of these projects come under the umbrella of the Terminal Management System (TERMS), which supports international traffic.

The TERMS is made up of 12 subsystems: 7 are currently in use and 5 are planned for future use. All but four deal with terminal operations. These four are the Transportation Discrepancy Reporting System, Discrepancy in Shipment Reporting System Freight Loss, and Damage Claims System, and the Mechanized Export Traffic System, which deal with all forms of shipments.

The terminal operating subsystems deal with the processes that cover the offering of cargo for overseas surface shipment, booking of cargo on ocean carriers, loading of ships, and preparation of the manifests. Customer queries about the status of their shipments and statistical data are also provided through these subsystems. In FY83, 13 million measurement tons of cargo moved through CONUS and overseas terminals at a total transportation cost of $153 million.

Mechanized Export Traffic System

The Mechanized Export Traffic System (METS II) subsystem, implemented in March 1984, is a traffic management system that supports the area command's cargo offering and booking offices. It is an on-line, interactive system that receives and processes offers of overseas shipments (Export Release Requests) from shippers for Release Unit Shipments (over 10,000 pounds). About 90 percent of these offers are received via AUTODIN. The first step after receipt of an Export Release Request is the manual process of selecting inland and ocean carriers and rates, ports of embarkation, and shipment dates. This booking data is prepared and entered through computer terminals to METS II. The area commands interface manually with MSC in the booking of

break-bulk cargo, which is usually carried on MSC ships. The shipper is given release data (rating and routing) and can then proceed with shipment. Editing, updating, reoffering, cancellations, adjustments, and corrections are all processed through the METS II master file. METS II automatically provides a skeleton Transportation Control and Movement Document (TCMD) to the TERMS On-line System (TOLS) Export (described below). This TCMD is later updated with information from the shipper's Advance TCMD (ATCMD).

Although the METS II is a recently developed subsystem, its major decision-making capabilities remain a manual process. When the Export Release Request is received, transportation specialists must determine the date and port of shipment, select an ocean carrier, and provide inland rating and routing data.

Terminal Management System

The Terminal Management System (TERMS) consists of two subsystems, the TERMS Import Cargo and the TERMS Export Cargo Documentation Systems. The TERMS Export Cargo Documentation System allows functional users to control and monitor cargo movement and cargo movement information, and provides status to shippers and vendors. ATCMD data, in accordance with MILSTAMP, is received from shippers for shipments under 10,000 pounds and from the Mechanized Export Traffic System for shipments over 10,000 pounds. Using computer screens located at ocean terminals, shipments are tracked as they are received, transferred and loaded into seavans, and stowed aboard a vessel.

Terms Export generates a hard copy manifest based on input supplied by the loading activity for placement on the ship. An advance copy of the manifest also is transmitted to the overseas port of destination for their use in planning and controlling the discharging of the vessel. Other copies are distributed by automated and manual modes to satisfy transportation, financial, and management requirements.

TERMS Import Cargo Documentation System

The TERMS Import Cargo Documentation System conforms to and implements MILSTAMP standards. The objective of the TERMS Import System is to provide terminals and

outports with documentation and reports for the planning and control of import vessels and cargo The Import System is a CONUS system, it is also in use in Panama. Like the export system, it also supports transportation financial and management systems.

The record received from the manifest prepared by the overseas terminal is maintained on the area command computer. Vessel data is made available via remote line printers to the terminal or outport that will discharge the vessel.

As each transaction takes place, cargo discharged, transferred and final disposition of the cargo, the area's computer is updated. This is accomplished in an interactive mode, and the operator has the opportunity to correct any record including contents of seavans.

In both TERMS Export and Import Cargo Documentation Systems, much of the input function is via interactive processing. Increased automation using LOGMARS[2] technology could reduce this manual input effort. The feasibility of such an approach has been demonstrated several times in unit movements and exercises where LOGMARS technology has been applied.

Automated Carrier Interface

The Automated Carrier Interface (ACI) subsystem will provide an automated interface between the MTMC computers and the computers of U.S. shipping lines, on the basis of Electronic Data Interchange (EDI) standards. EDI uses a set of tables that translate information into a standard code. The ACI will be implemented in three phases: Phase 1 will cover cargo offering and booking; Phase 2 will cover equipment control; and Phase 3 will cover billing invoices.

In Phase 1, the MTMC will offer cargo container data to a carrier who will respond with specific container and voyage information if it accepts the booking. In Phase 2, the ocean carrier will provide container status and location every time there is a change in status. In Phase 3, the MSC and the carrier will interface. The invoice will be electronically transmitted to MSC for payment.

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[2]Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) is a project investigating the establishment of standard bar code symbology for marking materiel, containers, and documentation.

Phase 1 is currently being tested with two carriers. If implementation is successful, Phase 2 should follow in late 1986. The invoices for Phase 3 are already being transmitted by carriers to MSC. When the MTMC is able to provide the shipping order/clearance orders and manifests electronically and the MSC can electronically match the data on all three documents, it will be possible to process the verified invoices without manual intervention.

Container Management System

The Container Management System (CMS) is being designed to provide the MTMC with a control system for worldwide DoD container movement during mobilization, using a consolidated data base containing data from METS II, TOLS, shippers, and carriers. It will control DoD owned and managed containers and will monitor the performance of shippers, ocean carriers, and MTMC traffic managers. Access to CMS will be available worldwide through intelligent terminals in Military Export Cargo Offering Booking Offices, in MTMC terminals, and in headquarters activities. Implementation of CMS is at least 2 years away.

Department of the Army Standard Port System

The Department of the Army Standard Port System (DASPS) was originally designed as a batch-mode, punched-card subsystem used to support operations at ocean terminals managed by MTMC in overseas areas. For the export process, the DASPS automated cargo receipt and vessel load planning and manifesting. The shipper offered cargo on hard copy or punched-card TCMDs which were entered into the system, and a prepunched card packet produced for the receipt, release, and loading of cargo. In the import process, the advance manifest received via AUTODIN was used for preparation of internal management documents and the TCMD.

In 1978, the Army decided to update DASPS computer equipment installed in mobile units being designed for Army field units. A system qualification test in 1985 was successful. It will take another year to field the new equipment. The new system will incorporate on line capability to the processes currently performed under DASPS and will be called DASPS-E (Enhanced). A batch update capability will be added in a later enhancement.

System for Predetermined Unit Requirements

The System for Predetermined Unit Requirements (SPUR) subsystem is used to process requests from Installation Transportation Offices (ITO) to move unit equipment from a CONUS base to an overseas area. The unit equipment data are taken from an Automated Unit Equipment List provided by Headquarters, U.S. Army Forces Command (FORSCOM), Computerized Movement Planning and Status System (COMPASS).

The MTMC area command receives these requests and enters the data in the SPUR subsystem. The command then manually books a ship and selects a terminal and inland transportation for the move to the terminal. (These processes are similar to those performed under METS II for cargo movements.) The booking and routing data are also entered into SPUR. The ITO is given the inland transportation and port call data by telephone. SPUR provides data automatically to TOLS, where the ATCMDs and manifests are prepared.

Automated System for Predetermined Unit Requirements

The Automated System for Predetermined Unit Requirements (ASPUR) subsystem is an enhancement of SPUR that will enable the MTMC area commands to connect directly to the ITO through computer terminals that would be used in the proposed Transportation Coordinators Automated Command and Control Information System (TC ACCIS). This capability will allow the ITO to rapidly inform MTMC of the unit's movement requirements. Rating, routing, and shipping and port selection would be done manually, as under SPUR. However, those processes would be recorded in the METS II system and would result in an automatic ATCMD to TOLS. Load planning will also be done manually until the Computerized Deployment System is implemented.

ASPUR will be ready in 1986 and will be put into use, even though the TC ACCIS computer terminals will not be available to the ITOs.

Crisis Action Management System

The Crisis Action Management System (CAMS) is composed of two modules, an ITO/MTMC Interface Module and a Terminal Support Module. These are described below.

ITO/MTMC Interface Module. MTMC and the Army FORSCOM are fielding a communications module as an interim to the TC ACCIS communications capability. This module of the CAMS project provides the capability to transfer Automated Unit Equipment List data from FORSCOM installations to MTMC area commands. Using microcomputers at the installations and the ASPUR system at the MTMC areas, the system provides a capability to communicate data concerning units scheduled to deploy. This ability will improve cargo management both during the ship assignment phase and the terminal phase of the operation. Software for the system is being designed by Oak Ridge National Laboratory and is scheduled for deployment in February or March 1986. When the more elaborate TC ACCIS is available, the proposed hardware is adaptable to office automation minimizing obsolescence costs.

CAMS Terminal Support Module This module interfaces MTMC microcomputers and Level-6 machines. The TOLS data base can be down-loaded to the microcomputer to provide report generation capability to terminal operators. It also provides an interface for LOGMARS readers. This module provides both near-term stand-alone processing and reporting capability and as an interface between the Level-6 mainframe terminal operator microcomputers and LOGMARS reader is the basic building block for future modernization programs.

Computerized Deployment System

The Computerized Deployment System (CODES) is an effort to develop an automated ship pre-stow planning system to support MTMC's surface cargo movement mission during crisis situations. CODES will provide load planners with a means of rapidly consolidating, processing, and displaying cargo data and ship information.

CODES is being designed to significantly decrease the man-hours necessary to stow plan a ship. This system consists of three main components: (1) cargo characteristics data base, (2) ship characteristics data base library, and (3) graphics/templating component. These three components will produce preliminary, intermediate, and final stow plans.

A CODES prototype system is currently under development to increase the program efficiency and improve the man-machine interface. Similar system enhancement and modernization

efforts are underway for transportation planning, management, and MILSTAMP procedural reporting at MSC and MAC.

SUMMARY

The DoD logistics management systems are being extensively revised and upgraded to take advantage of: (1) new data processing technologies (e.g., data base management systems, interactive processing, fourth generation operating systems and programming languages); (2) computer hardware technologies (e.g., microcomputers, fourth/fifth generation computers, protocol converters); and (3) electronic data communications (e.g., hyperchannels, LANs, WANs, IGPs). During this extensive modernization period, attempts to apply significant changes to DLSS policies or procedures will be difficult. Organizations involved in these modernization efforts will be reluctant to incorporate detailed procedural changes until existing procedures are updated and thoroughly tested, through parallel operations, to ensure accuracy and accountability. However, DoD-wide information systems standardization and modernization plans, such as expanded fixed- or variable-length record images, LAN/WAN interface standards, or integration of procedures, may be practical.

4. COMMUNICATIONS ISSUES

The computer and communications systems used to support Defense logistics traffic operate as a unified, large-scale, distributed data processing system using a heterogeneous mix of equipment. The various systems rely on the use of the Defense Automatic Addressing System (DAAS) as a focal point to provide the controls, interfacing, and record-keeping characteristic of a centralized system. The logistics community communication systems support 45,000 DoD and 85,000 civil agency and congressional subscriber addressees throughout the world.

The current successful operation of logistics information communications systems can be attributed to:

- The uniform policies and procedures for the interchange of logistics data among DoD logistics management organizations specified by the DLSS.
- The operation of DAAS which performs the functions of routing, validations, editing, tracing, record keeping, and evaluation of nearly all logistics traffic.
- The special services performed by DAAS for system users who comply with the requirements of the DLSS. These services include message reformatting, screening, and report preparation.

Though the communications systems and their supporting standards currently operate reliably, the present structure limits the ability of users to upgrade equipment as required by changing missions and the need for equipment modernization. It is also difficult to accommodate special processing requirements characteristic of a system as large and diverse as the Defense logistics community. In many respects, the key to increasing logistics information flow flexibility lies with the implementation of a communication system with interfaces offering the capability to adapt to changing requirements. For this reason, analysis of the logistics community's communications systems has been emphasized during the current study task.

This section provides a description of the existing logistics communications systems. It includes a discussion of the existing environment for long haul data transmission using networks known as wide area networks (WANs).

LOGISTICS INFORMATION COMMUNICATIONS SYSTEMS

Logistics communications within DoD make use of a complex hierarchy of systems implemented by the Services, DLA, and the Defense Communications Agency (DCA). At present, the primary transmission and switching facilities are provided by the Automatic Digital Network (AUTODIN). The Defense Data Network (DDN) being implemented by DCA is intended to serve as a replacement for the AUTODIN services. However, the use of this network will require modifications to existing logistics processing systems. For this reason, it will be many years before the entire logistics system is configured to DDN.

Facilities other than AUTODIN and DDN are used for special logistics communication purposes. For example, the commercial telephone system is used to carry the traffic of the International Logistics Communications System (ILCS), and leased American Telephone and Telegraph (AT&T) lines are used with DLA switches to provide the on-line inquiry capability of DLANET.

The DAAS System

AUTODIN provides the primary data communications facilities for logistics traffic. The DAAS connects the Service bases and other logistics customers to the Inventory Control Points (ICPs). Most of the traffic within CONUS is transmitted by AUTODIN to one of two DAAS sites. These sites are located at Gentile Air Force Station in Dayton, Ohio, and at the Western Division in the Defense Depot in Tracy, California.

The categories of communications transmitted through DAAS are listed in Table 4-1. Within the "A" series of documents, the A0E and A05 series are not transmitted through DAAS because they require exception data. Document series B, X, and Y include either intra Service or non-standard communications, that are processed by DAAS as a special service to the logistics community and do not necessarily have a direct relationship to the inter-Service and DLSS logistics process.

Transmission from a logistics customer is usually initiated at a base level computer system. This transmission is received at one of the DAAS sites, which validates, edits, and routes the

TABLE 4-1. SOURCES OF DOCUMENTS PROCESSED BY DAAS

SERIES	SYSTEM/ISSUANCE OR PURPOSE
A--	Military Standard Requisitioning and Issue Procedures (MILSTRIP), DoD 4140.17-M
B--	Actions and/or Formats Not Presently Covered by Military Standard Systems
C--	Actions and/or Formats Not Presently Covered by Military Standard Systems
D--	Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP), DoD 4140.22-M
F--	Military Standard Billing System (MILSBILLS), DoD 4000.25-7-M
G--	FT – Reserved for DoD Excess Material Returns Program Procedures
H--	Military Standard Billing System (MILSBILLS), DoD 4000.25-7-M Note: Approved for deletion per DoD MILSO letter dated 30 July 1982
I--	Alpha Character in Second Position – Reserved for Simulated Mobilization Exercises (MILSBILLS) Numeric Character in Second Position Reserved for DoD Program for Stability of Civilian Employment and Automated Career Management System
J--	Defense Disposal Program, DoD 4160.21-M, Defense Retail Interservice Support Program, DoD 4000.19-M
K--	Defense Integrated Data System (DIDS), DoD 4100.39-M
L	Defense Integrated Data System (DIDS), DoD 4100.39-M
M	Reserved for DoD Use with the Following Exceptions MA – Military Assistance Program Address Directory ML, MM, MN, MP, MQ, MR – Reserved for U.S. Army Medical Department Property Accounting System
N	Reserved for DLA Mechanization of Contract Adminstration Services (MOCAS) Program
O	Reserved for DoD Use

NOTE: Document Identifier Code series starting with a numeric character are available for use by the Services/agencies purposes other than those defined above. Series 7 and 9 are processed by DAAS.

TABLE 4-1. SOURCES OF DOCUMENTS PROCESSED BY DAAS (CONTINUED)

SERIES	SYSTEM/ISSUANCE OR PURPOSE
P-	Alphabetic Character Second Position Military Standard Contract Administration Procedures (MILSCAP), DoD 4105.63-M Numeric Character Second Position – Military Standard Petroleum System (MILSPETS), DoD 4140.25-M
Q-	Reserved for Defense Automatic Addressing System (DAAS), DoD 4140.29-M
R-	Reserved for Simulated Mobilization Exercises (MILSTAMP) with following exceptions RH – Reserved for DoD Hazardous Materiel Information System Numeric Character is Second Position – Defense Intransit Item Visibility System
S-	S1- and S2- Series only – Military Supply and Transportation Evaluation Procedures (MILSTEP), DoD 4000.23-M S5-, S6-, S7-, S8-, and S9 – Series Joint Conventional Ammunition Program Management Information System
T-	Military Standard Transportation and Movement Procedures (MILSTAMP), DoD 4500.32-R
U-	Reserved for Simulated Mobilization Exercises (MILSTRIP)
V-	Reserved for DoD Use
W-	Reserved for DoD Use with following exceptions WR – Reserved for Joint Publication AFLC Reg 400-21, DARCOM Reg 700-60, NAVMAT Instruction 4790.23A, MCO P 4410.22A WX – Reserved for DoD Provisioning (Weapons Systems) WZ – Reserved for Defense Integrated Materiel Management for Consumable Items Program
X-	Intra-Service transactions relating to Internal Service Agency Systems
Y-	Internal depot, supply source or base operations transactions
Z-	Internal depot, supply source or base operations transactions

NOTE: Document Identifier Code series starting with a numeric character are available for use by the Services/agencies purposes other than those defined above. Series [illegible] are processed by DAAS.

selected documents to the correct source of supply. The source of supply is the ICP that has jurisdiction over the materiel referenced in the received transmission.

Thus the communications systems can be described in terms of two, interconnected star networks as shown in Figure 4-1. (See Appendix B for discussion of network types.) Transmission of data between the two DAAS sites is the largest component of the total DAAS traffic. Twenty percent of the total system volume consists of traffic between the two DAAS sites.

The description of the logistics information communications systems as a star network is a simplification of the actual system. The use of AUTODIN as an intermediate transmission facility would modify the star network to include a mesh on each of its branches.

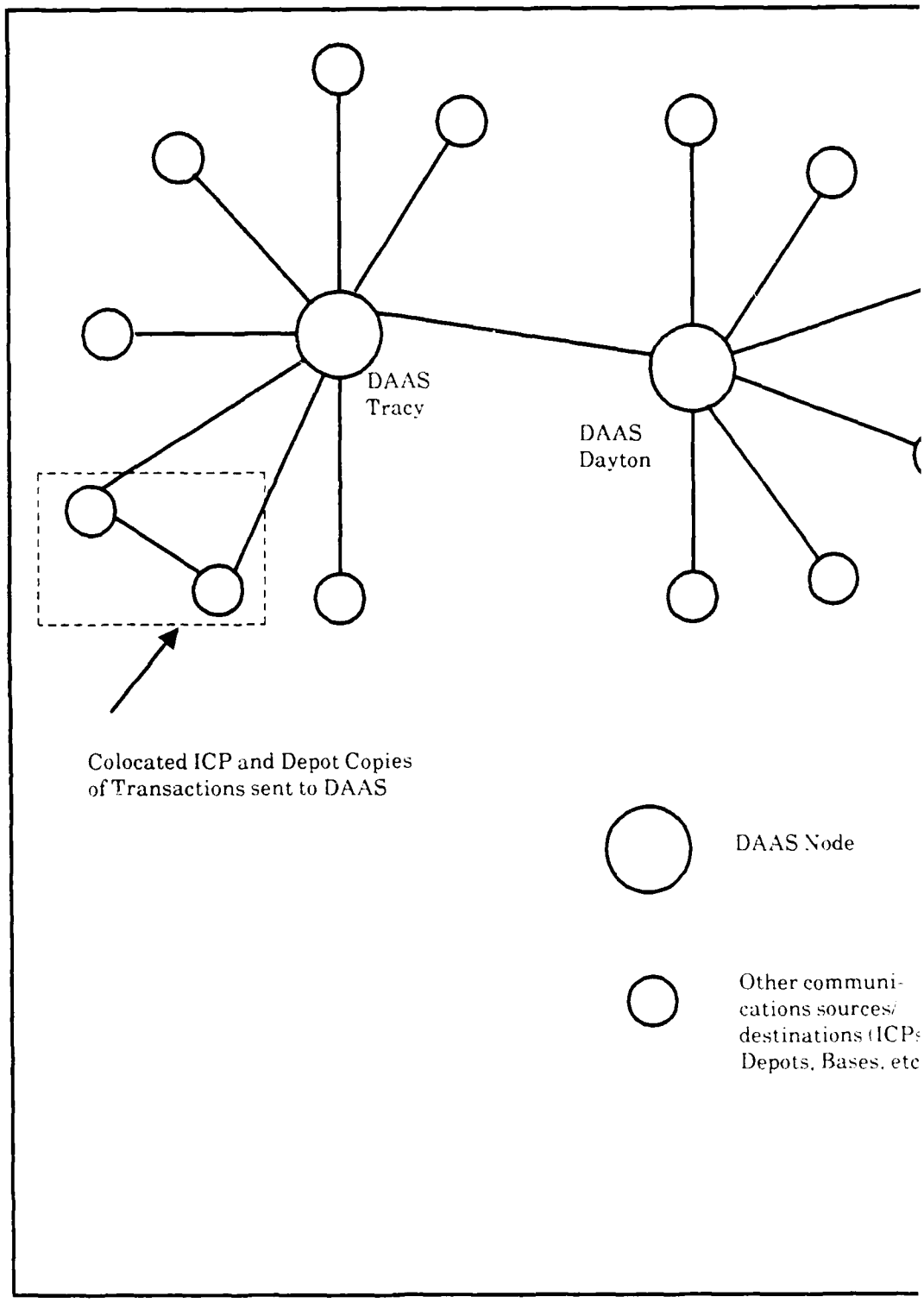
DAAS operates as a store-and-forward switching center which receives and assembles an entire message prior to its processing and retransmission. All outgoing messages are queued for transmission to their destination. Priority messages may be queued for up to 10 minutes, while routine messages may be queued for up to 1 hour. Queuing may be reduced if more than 498 transactions are contained in the queue. The purpose of queuing is to make efficient use of the AUTODIN system.

DAAS Functions. As noted earlier, DAAS is responsible for performing the basic functions of validation, routing, editing, and maintaining records of all communications that pass through the system. In addition, DAAS performs the important function of batching different types of documents destined for various activities into a single message for each destination. This function is performed to minimize the impact of the logistics traffic on the AUTODIN network and communications centers.

DAAS performs a number of functions that are important to the communications and processing functions of the logistics system, including:

- Maintenance of a shipment status correlation file to process MILSTRIP mass cancellation requests and MILSTRAP Material Receipt Acknowledgment Documents.
- Operation of the Defense European/Pacific Redistribution Activity for processing excess reports, requisitions, and related supply documents, including overseas redistribution functions. This function is performed at the Dayton facility.

FIGURE 4-1. DAAS NETWORK TOPOLOGY



Note: All links pass through AUTODIN

- Retention of MILSBILLS interfund billing documents on file for 120 days to accommodate requests for retransmission. The retention period is currently being increased to 1 year. So far, 250,000 bills have been retained for the current year. This function is being performed at the Dayton facility.

- Operation and maintenance of the MILSTEP CDCP under the DoD 4000.23-M, Military Supply and Transportation Evaluation Procedures (MILSTEP). This function is performed at the Tracy facility.

- Maintenance of the DoD Activity Address File which includes the names and addresses of activities which must be identified in the DLSS.

- Acting as the destination point for all logistics documents during periods when "MINIMIZE" conditions are imposed. (MIMIMIZE conditions occur when military operations generate a high level of communications traffic. To reduce the delays experienced by high priority traffic, all other transmissions are deferred or sent using alternative means such as the U.S. mail.) During these conditions, DAAS receives all requisitions and forwards them in accordance with the requirements of MINIMIZE. This may include the use of mail when the use of AUTODIN is prohibited. DAAS may also be asked to hold all routine transmissions in the event of mobilization and send only priority transmissions unless they have the JCS designator.

- Routing of some MILSCAP documents. These documents must be transmitted through the DAAS data base because the DAAS data base contains the extended origin and destination information coded in the 80 position formats.

- Termination of Foreign Military Sales (FMS) traffic to countries, based on possible changes in diplomatic relationships.

- Response to requests for retransmission of documents that may have been received with errors.

- Maintenance of an input/output message tape for 30 days, useful for tracing specific messages and documents.

- Provision of source of supply and address information in response to queries from various organizations.

- Responsibility for the operations and the interface with the ILCS. DAAS personnel are responsible for configuring on-site ILCS processing equipment. The logistics traffic originating from ILCS sites is received, processed, and routed by DAAS.

- Preparation and distribution of Logistics Information Data Services reports. These reports are extracts from the maintained history records of all documents processed by DAAS.

- Provision of special functions for the Services. Examples of these functions include:

  - Transmitting duplicate data for storage in the Army's Logistics Intelligence File maintained at the Presidio.

- Submission of Materiel Order Validations for organizations which are unable to prepare their own .

- Preparing punched cards of transaction responses for Navy ships.

- Modifying transactions in accordance with specific operating requests of the individual Services. These modifications are usually performed in response to a request from a Service that cannot accommodate a modification made to the DLSS.

- Acting as the interface between all civilian agencies and the Defense logistics system. Approximately 10 percent of the current DAAS traffic originates from civilian agencies. The major civilian agency users of DAAS are the General Services Administration, U.S. Department of Agriculture, State Department, National Security Agency, Central Intelligence Agency, Federal Bureau of Investigation , General Accounting Office (GAO), Coast Guard, National Aeronautics and Space Administration , and the Federal Aviation Administration.

- Preparation of special reports requested by organizations such as the Inspector General, GAO, and DLA.

From this partial list of services, it is evident that DAAS has a key role in providing necessary communications interfaces between the many organizations that must use the Defense logistics system.

DAAS Traffic Volumes. The results of a recently completed study of DAAS indicate that an average of 60 million logistics document transactions per month are processed by DAAS. This traffic, handled at Dayton, Ohio, and Tracy, California, supports 45,000 DoD subscribers and 85,000 civil agency subscriber addresses worldwide. The DAAS traffic is continuing to increase each year. (See Table 4-2.) It is also significant that 43 percent of total DAAS input and output traffic is

TABLE 4-2. DAAS TRANSACTION VOLUMES FOR YEARS FROM 1982 TO 1984

CALENDAR YEAR	MILLIONS OF TRANSACTIONS			PERCENT CHANGE
	Input	Output	Total	
1982	516.9	613.1	1,130.0	4.8
1983	461.7	703.5	1,165.2	3.1
1984	493.2	732.2	1,225.4	5.2

generated by only 20 of its more than 130,000 customers. An additional 20 percent of the DAAS traffic is generated by communications between the Dayton and Tracy facilities. Thus approximately 10 percent of DAAS customers are responsible for 63 percent of the traffic. The 30 heaviest users volumes are summarized in Tables 4-3 and 4-4. Table 4-5 provides organizational information about these customers.

DAAS Equipment Configuration. The existing DAAS equipment configuration includes the Control Data Corporation model 3500 and 1700 computers. This equipment was purchased in 1974 and expanded in 1976. The computers provide communications interfacing and processing of all data received, processed, stored, and retransmitted by the system. While this equipment is generally adequate for existing workloads, it has exceeded its life expectancy by several years. Maintenance is becoming more difficult, and some items of equipment, such as the 3500 tape drives, are no longer maintained by Control Data Corporation. It is also difficult to expand the system to accommodate increasing workloads.

For this reason, the DAAS Office (DAASO) has initiated a DAAS ADP Replacement Program (DARP) to upgrade the existing configuration. The DARP is scheduled for completion in 1989 and is planned as a five-phase implementation.

The DARP system design is based on use of the Network Systems Corporation Hyperchannel architecture. The Hyperchannel serves as a common bus, which permits high-speed data communications at a rate of 50 million bits per second (Mbps) between devices that share the channel. The new architecture of DAAS will be based on a bus topology that can readily accommodate new equipment to accept changes in mission or increases in workload. The architecture will also facilitate interfaces with AUTODIN (designated the DAASO AUTODIN Control System-II; DACS-II) and DDN (designated the DAASO Network Control System), since both interfaces can be connected directly to the bus, that will transmit the data to the new DAAS processors.

The DARP will include the acquisition of hardware and software for a DAASO Integrated File Management System/DBMS, which will be used for supporting on-line inquiries into the DAAS statistical data base.

TABLE 4-3. HIGH-VOLUME-INPUT USERS OF DAAS

SERVICE OR AGENCY	ACTIVITY	INPUT TO DAAS (DOCUMENTS)	TRAFFIC VOLUME (PERCENT)	CUMULATIVE VOLUME (PERCENT)
1. GSA	GSA	2,772,718	9	9
2. DLA	DPSC	1,925,045	6	15
3. DLA	DISC	1,914,678	6	21
4. DLA	DCSC	1,833,861	6	27
5. DLA	DDMP	1,537,696	5	32
6. Navy	Philadelphia	1,489,973	5	37
7. DLA	DESC	1,427,158	5	42
8. Army	TARC	1,394,740	5	57
9. DLA	DGSC	1,374,691	4	51
10. DLA	DDMT	1,292,093	4	55
11. DLA	DDOU	1,292,083	4	59
12. Navy	Norfolk	1,273,985	4	63
13. Air Force	Kelly	1,025,608	3	66
14. Army	Cumberland	34,505	3	69
15. Air Force	Robins	890,065	3	72
16. Air Force	Tinker	886,099	3	75
17. DLA	DDTC	797,230	3	78
18. Navy	SPCC	757,121	3	81
19. Navy	San Diego	754,217	2	83
20. Air Force	Wright-Patterson	670,377	3	85
21. Navy	Oakland	660,341	2	87
22. Army	Fort Monmouth	586,926	2	89
23. Air Force	Ogden	554,228	2	91
24. Air Force	McClellan	545,924	2	93
25. Army	TSARC	535,674	2	95
26. Army	Red River	435,113	1	96
27. Air Force	ARC	346,761	1	97
28. DLA	DLSC	291,083	1	98
29. Air Force	Hickam	276,381	1	99
30. Air Force	Langley	274,605	1	100
Total Volume		30,780,979		

SOURCE William T. James III, DAAS Functions in the DDN Environment, MTR-84W00211 (McLean, Virginia: The MITRE Corporation, September 1984).

TABLE 4-4. HIGH-VOLUME-OUTPUT USERS OF DAAS

SERVICE OR AGENCY	ACTIVITY	OUTPUT TO DAAS (DOCUMENTS)	TRAFFIC VOLUME (PERCENT)	CUMULATIVE VOLUME (PERCENT)
1. Army	Presidio	8,560,533	27	27
2. Air Force	Peterson	2,076,665	7	34
3. DLA	DISC	1,837,348	6	40
4. Air Force	Wright-Patterson	1,490,671	5	45
5. Navy	Philadelphia	1,371,007	4	49
6. DLA	DESC	1,264,424	4	53
7. DLA	DSCS	1,184,052	4	57
8. Air Force	Robins	1,161,140	3	60
9. DLA	DPSC	1,078,588	3	63
10. Air Force	Kelly	947,547	3	66
11. Army	Cumberland	882,821	3	69
12. Air Force	Langley	725,535	2	71
13. GSA	GSA	707,357	2	73
14. Navy	SPCC	702,648	2	75
15. Air Force	McClellan	682,800	2	77
16. DLA	DGSC	663,583	2	79
17. DLA	DDOU	640,222	2	81
18. Air Force	Ogden	628,265	2	83
19. Air Force	Scott	602,546	2	85
20. Army	Fort Monmouth	595,547	2	89
21. DLA	DDMT	557,490	2	89
22. Army	TARC	491,973	2	91
23. DLA	DDMP	474,799	2	93
24. Navy	Norfolk	465,493	1	94
25. Air Force	Hickham	364,328	1	95
26. Navy	Oakland	332,152	1	96
27. Air Force	ARC	321,357	1	97
28. DLA	DDTC	305,843	1	98
29. Army	ZWEIB	277,151	1	99
30. Navy	SUBIC	266,776	1	100
Total Volume		31,660,661		

SOURCE: William T. James III, DAAS Functions in the DDN Environment, MTR-84W00211 (McLean, Virginia: The MITRE Corporation, September 1984).

TABLE 4-5. THIRTY FIVE HEAVIEST USERS OF DAAS IN MARCH 1984

ID CODE	ACTIVITY	AGENCY OR SERVICE
DISC	Defense Industrial Supply Center, Philadelphia, PA	DLA
DESC	Defense Electronics Supply Center, Dayton, OH	DLA
DCSC	Defense Construction Supply Center, Columbus, OH	DLA
DPSC	Defense Personnel Support Center, Philadelphia, PA	DLA
DGSC	Defense General Supply Center, Richmond, VA	DLA
DDOU	Defense Depot, Ogden, UT	DLA
DDMT	Defense Depot, Memphis, TN	DLA
DDMP	Defense Depot, Mechanicsburg, PA	DLA
DDTC	Defense Depot, Tracy, CA	DLA
DLSC	Defense Logistics Support Center, Battle Creek, MI	DLA
Peterson	Peterson Air Force Base, CO	Air Force
Wright-Patterson	Wright-Patterson Air Force Base, OH	Air Force
Robins	Warner Robins Air Logistics Center, Robins Air Force Base, GA	Air Force
Kelly	San Antonio Air Logistics Center, Kelly Air Force Base, TX	Air Force
Langley	Langley Air Force Base, VA	Air Force
McClellan	Sacramento Air Logistics Center, McClellan Air Force Base, CA	Air Force
Ogden	Ogden Air Logistics Center, Hill Air Force Base, UT	Air Force
Scott	Scott Air Force Base, IL	Air Force
Hickam	Base Supply, Hickam Air Force Base, HI	Air Force
Tinker	Oklahoma City Air Logistics Center, Tinker Air Force Base, OK	Air Force

SOURCE: William T. James III, DAAS Functions in the DDN Environment, MTR-84W00211 (McLean, Virginia: The MITRE Corporation, September 1984).

TABLE 4-5. THIRTY FIVE HEAVIEST USERS OF DAAS IN MARCH 1984 (CONTINUED)

ID CODE	ACTIVITY	AGENCY OR SERVICE
Presidio	U.S. Army Logistics Control Acitivity, Presidio, U.S. Army Presidio, San Francisco, CA	Army
Cumberland	New Cumberland Army Depot, International Logistics Control, New Cumberland, PA	Army
Fort Monmouth	U.S. Army Electronics Command, Fort Monmouth, NJ	Army
TARC	Tank Automotive Readiness Command, Warren, MI	Army
ARC	Aviation Readiness Command, Rock Island, IL	Army
ZWEIB	U.S. Army Zeibruecken, GY	Army
TSARC	Troop Support Automotive Readiness Command, St. Louis, MO	Army
Red River	Red River Army Depot, Texarkana, TX	Army
Philadelphia	Aviation Supply Office, Navy Pubs. and Forms Center, Navy Internaitonal Logistics Control Office, Philadelphia, PA	Navy
SPCC	Ships Parts Control Center, Mechanicsburg, PA	Navy
Norfolk	On-Line AUTODIN Naval Supply Center, Norfolk, Va	Navy
Oakland	On-Line AUTODIN Naval Supply Center, Oakland, CA	Navy
SUBIC	Naval Supply Depot, Subic Bay, PI	Navy
San Diego	On-Line AUTODIN Naval Supply Center, San Diego, CA	Navy
GSA	General Services Administration, Washington, DC	GSA

SOURCE: William T. James III, DAAS Functions in the DDN Environment, MTR-84W00211 (McLean, Virginia: The MITRE Corporation, September 1984).

International Logistics Communications System

The International Logistics Communications System (ILCS) has been developed to provide a facility for automated transmission of international logistics traffic from foreign locations and selected U.S. locations that do not have access to AUTODIN. All ILCS traffic is transmitted by the public telephone system through the Automated Data Phone System (FADS) in Dayton, Ohio. FADS communications are transmitted to DAAS, where they are routed to the correct CONUS facility. Return traffic is routed from the originating CONUS facility through DAAS and FADS, back to the customer.

The ILCS carries narrative, administrative messages in addition to data messages. All traffic is unclassified. It is operated for 15 countries, 60 Air Force maintenance contractors, U.S. freight forwarders, and U.S.-based contractors. Since the ILCS includes terminal equipment that is connected to DAAS using the commercial telephone system, it serves as the basis for non-AUTODIN connections into the DLSS.

All ILCS users are provided with a turnkey system designated the International Logistics Overseas Support System. This is a turnkey computer system that includes all the hardware, software, documentation, training and continuing support required for its operation. Three system sizes are provided, at a capital cost to the user of between $25,000 and $65,000 depending on the required capacity. Annual recurring costs of between $17,000 and $25,000 are billed to each subscriber for system maintenance and support.

Service Communication Systems

The Services and DLA are all modernizing their logistics information communications systems. The AFLC's present design and planned implementation of a Logistics Network (LOGNET) system is an example of these modernization efforts.

The objectives of the LOGNET system design are similar to those of the DARP. The LOGNET was established to provide a flexible and expandable system for intersite communications at AFLC headquarters, as well as the five ALCs. The system design is intended to improve on-line terminal access to the logistics data bases maintained by AFLC.

A functional description of the system is now available. A final system hardware configuration will be defined following the selection of a system implementation contractor. The system configuration consists of a high-capacity broadband local area network (LAN), described in Appendix B that is connected to AFLC's large mainframe data processing applications, such as the Stock Control and Distribution System (SC&D) and the Requirements Data Bank (RDB). In addition, the broadband LAN will be connected to the DDN and AUTODIN through interface devices, designated the Intersite Gateway and M024B, respectively. Intelligent Gateway Processors (IGP), described later in this section, will also be connected to the broadband LAN to act as an interface for interactive processing from other sites.

A lower capacity baseband LAN (also described in Appendix B) will be connected to the broadband LAN to provide access from conventional office automation systems through a single interface point. The baseband LAN will enable users of microcomputer equipment to access the logistics systems without extensive interface equipment.

This system concept is similar to the modernization concept being implemented by DAASO in that it permits a phased upgrading of existing logistics system processing equipment. It also provides the capability for future expansion by permitting the attachment of new devices to the LAN without modifications of existing equipment.

WIDE AREA NETWORKS

Wide area networks (WANs) are used to transmit data over long distances. These networks include transmission media such as terrestrial lines, microwave links, or satellite links, and switches. Data is transmitted over these networks in the form of either complete messages or packets.

AUTODIN is the primary WAN data communications service now in use by the logistics community. The service is provided by Western Union under contract with DoD. Messages are routed through the system using a store-and-forward message switching technique. This technique requires that the entire message be received by each communications switch, before error checking and retransmission to either the next switch or to its final destination occurs

Defense Data Network

The Defense Data Network (DDN) currently under development, is intended to provide the defense community with the next generation of data communications services. Since defense logistics traffic is the largest single source of data traffic within DoD, implementation of DDN will have a major effect on the operation and future design of the logistics information communications system.

The DDN is designed to operate as a packet switching network. This type of network operates by dividing data messages into small packets that are individually routed and otherwise processed as though they were separate messages. Each switching node of the network receives the packets, checks them for errors, corrects the errors or requests a retransmission of data, then either forwards them to another node or collects all the received packets into an overall message, and transmits the message directly to the receiver.

DDN is designed to operate as a datagram service in which the packets of a message may not all be routed over the same path. In DDN, packets are routed according to circuit loading or they may be routed around inoperable nodes. This feature leads to a high level of survivability and availability. Packet switching is used in place of message switching (which is used by AUTODIN) to reduce transmission delay and simplify the procedures required for error recovery.

DDN Functional Areas. The DDN elements have been grouped into two functional areas including:

- The backbone network, which includes the trunk circuits and packet switches
- The access network, which includes the circuits and interface equipment that connects the subscriber equipment with the backbone.

The DDN backbone will include approximately 200 packet switches installed at about 100 sites. Each packet switch is a Bolt, Beranek, and Newman (BBN) C/30 minicomputer. The backbone transmission links in CONUS consist of terrestrial leased digital circuits operating at data rates of 56,000 bits per second, or analog circuits operating at data rates of 50,000 bps. Overseas links consist of 9,600 bps analog circuits implemented using satellites.

The access network includes two types of interface equipment. Host computer systems are connected to the packet switches using Host Front-End-Processors (HFEPs) or through Terminal Emulation Processors (TEPs). In some cases, HFEPs may be connected directly with the switches. Both the HFEPs and the TEPs are DDN-developed equipment. The transmission speeds of the host circuits will be between 2,400 and 56,000 bps. More than one circuit may be used to connect the host processor with the network.

Terminals are to be connected to the network through a DDN developed Terminal Access Controller (TAC). Alternatively, terminals may be connected to the DDN indirectly through a host processor. The TAC will support between 1 and 64 terminals using leased or dial-up lines that operate at speeds between 100 and 19,200 bps.

DDN Protocols. A series of standards have been developed for the DDN in order to define the interface requirements for every level of the Open Systems Interface (OSI) model (see Appendix C). These standards include:

- The acceptable network access protocols for DDN are based on the X.25 protocol of the International Consultative Committee on Telegraphy and Telephony (CCITT) as implemented by the DDN, or the ARPANET protocol defined by the DoD Advanced Research Projects Agency. The X.25 protocol is the interface standard used by many commercially switched data transmission systems and has been supplemented to meet DoD requirements.

- A Transmission Control Protocol (TCP). The TCP defines the connections between users and controls the flow of data between users. An Internet Protocol (IP) defines the manner in which communications are performed across multiple networks. To meet this requirement, the IP provides a global addressing system that makes worldwide data communications possible for DoD. Together the two protocols are designated TCP/IP.

- DDN has defined application services and protocols for interfacing applications programs with the TCP/IP layer. Examples of acceptable application services and protocols include:

  - General Telephone's (TELNET) protocol, which defines the interface with a standard terminal device. The TELNET protocol is designed so that the communications system is transparent to the user who "thinks" that interaction is taking place directly with the host computer

  - File Transfer Protocol, which defines network file-related activities, such as copying, appending, deleting, and renaming files, common to all network users

- Simple Mail Transfer Protocol, which supports electronic message transfers over DDN. The SMTP is essentially an electronic mail service that will be provided to DDN users who access designated "mail hosts."

- Optional protocols which are defined by users for connecting host computers with DDN. It is likely that these optional protocols will be used by DoD logistics information communications sytems installations accessing DDN, based on the definitions of the DLSS.

The available protocols and standards are likely to change and expand as DDN usage increases. For example, the TCP/IP protocols are incompatible with the comparable protocols that have been defined by the International Standards Organization (ISO). ISO protocols designated TP4 are receiving consideration as alternatives because of the possibility that they will become an international commercial standard.

DDN Performance. High levels of performance are projected for the DDN:

- Availability: 99.00 percent for single-home subscribers (single line connecting the subscriber with the switch), 99.95 percent for dual-home subscribers.

- End-to-end delay: Average delay of 0.090 seconds for high precedence traffic. Average delay of 0.122 seconds for routine precedence traffic. Ninety-ninth percentile delay of 0.224 seconds for high precedence traffic. Ninety-ninth percentile delay of 0.458 seconds for routine precedence traffic.

- Probability of undetected errors 4.2×10^{-18}.

- Probability of misdelivering packet 5.5×10^{-12}.

These performance levels are consistent with the requirements of an interactive, on-line inquiry system, which requires rapid interaction between the terminal user and the host computer. The new logistics systems that are incorporating on-line capabilities are relying on the ability of the DDN to provide the stated performance levels in order to support these planned capabilities.

DDN Schedule and Costs. Plans call for DDN to be implemented in four stages. When implementation enters the third stage, early in FY86, enough capacity will be available for a single network supporting multiple levels of security. In the third stage, the network will be large enough to benefit from economies of scale and to enjoy a significant level of survivability. Fourth-stage operation is scheduled to begin early in FY1987. The network will then be mature, providing DoD with full communication capabilities.

At present, DDN subscribers incur costs for startup items such as hardware, software, training, planning, and special interface requirements with the network. The costs of overall network development and operation are now shared between DoD and the Military Departments. However, future plans are for the costs of operating and maintaining the network to be billed to subscribers on the basis of usage. While the cost algorithm has not yet been developed, it is obviously in the best interest of the Defense logistics community to optimize its usage of DDN facilities.

DLANET

DLA provides a dedicated communications network for sites in CONUS that want on-line access to the data bases maintained by DLA ICP depots, DCASRs, and service centers. These sites access DLA data bases for purposes such as determining requisition status, inventory status, and retrieving statistics related to system performance. Two Service installations have begun limited testing of the feasibility of using DLANET for such access. The system which became operational in May 1981, currently supports 10,000 physical devices (terminals), and includes 29 nodes that serve as concentrators and interfaces for the communications traffic.

DLANET is not a switched system and, for this reason, operates quite differently from either AUTODIN or DDN. It is a polled multidrop system in which the polling function is performed by Comten processors which also provide the interfacing and routing functions in the network. Although they do not perform dynamic switching functions, their [illegible] that of a store-and-forward switch in that they must have enough [illegible] message queues in the routing process. The Comten [illegible] memories that are inadequate for storing the [illegible] memory expansion of these processors [illegible]

Transmission [illegible]

which provide [illegible]

access [illegible]

AD-A193 251 A REPORT ON CURRENT LOGISTICS SYSTEM CONCEPTS(U) 2/2
LOGISTICS MANAGEMENT INST BETHESDA MD P A YOUNG ET AL.
DEC 85 LMI-DL502R2 MDA903-85-C-0139

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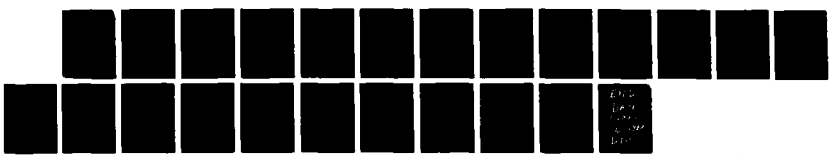

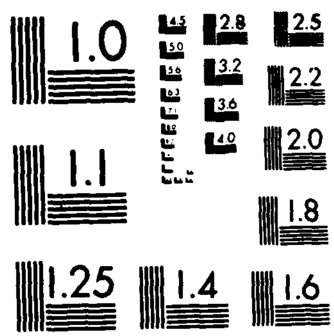

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Because the DLANET is not a dynamically switched system, the installation of new terminals requires that the Comten data bases be updated for addressing and routing data transmitted from the new terminal. The system will have an estimated maximum capacity of approximately 25,000 terminals after the additional memory has been acquired for the Comten processors.

DLANET has been designed for communications between on-line terminals and DLA computers. It was not designed as a substitute for the logistics traffic processed by DAAS and, for this reason, it only has the capacity required for inquiry-type traffic.

GATEWAYS

The present success of the Defense logistics community with the interconnection of diverse computer systems is a result of enforcement of the DLSS, as well as the availability of DAAS to provide the necessary interface and translation functions. But this success has been achieved at the cost of establishing a system that is difficult to modify and expand without the agreement of all participants.

The plans of the DAASO and the individual Services for future systems reflect an effort to create a system that is more adaptable to changing technology and user requirements. The design of these modernized data processing systems frequently includes high-capacity LANs with interface devices capable of being reprogrammed to accommodate different communications protocols and user requirements. These devices are known as "gateways." A gateway is a device that connects two systems, especially where the systems operate with different protocols. For example, a gateway is needed to connect two independent local networks, or to connect a local network to a wide area network (WAN).

Several gateways have been developed recently which appear to satisfy these requirements. One is the Intelligent Gateway Processor (IGP) developed by the Lawrence Livermore National Laboratory in Livermore, California. The IGP was developed with the objective of providing a unified command structure for accessing different data bases. It is capable of interconnecting heterogeneous information resources at different sites in a unified and controlled manner. It uses the UNIX[1]

operating system and is implemented on a number of mini- and super-microcomputers. The IGP integrates all the functions required to achieve the stated objective, including integrated access to data files, application programs, and communications systems. The IGP program logic is controlled by information stored in the system data base. In this way, it can be readily adapted to new applications through data base changes rather than programming changes.

One IGP application for the Defense Technical Information Center is known as the Technology Information System. It is scheduled for completion in FY87 and will provide access to a number of different bibliographic data bases.

IGP developments are also underway at AFLC. Current plans are for IGPs to be connected with the broadband LANs of AFLC's LOGNET to provide access to both Air Force and DLA systems using a common set of commands.

This project and other similar developments represent opportunities to introduce flexibility into the design and operation of the communications and data processing configurations of the Defense logistics community.

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[1] UNIX is a registered trademark of Bell Laboratories.

5. IMPLICATIONS OF SYSTEM MODERNIZATION

Some possible effects upon user (unit retail-level) organizations and logistics community organizations of present and planned system modernization efforts are suggested in this chapter. These effects may influence organizational relationships, organizational responsibilities, and, in the final analysis, an organization's ability to successfully perform its assigned mission.

INVENTORY CONTROL POINTS

ICPs have already realized many of the benefits of increased automation, including mechanized requisition processing, exception reporting to item managers, automated funds control, and integrated inventory control with depot/stock control point automated systems. The effects at the ICP level are likely to result from two modernization projects: (1) on-line, interactive requisition processing and inquiry, and (2) on-line, interactive vendor ordering and delivery status inquiry. As a front-end to the requisition process, *interactive capabilities may have two important implications*:

- When a user is able to immediately see that a requested item is not in inventory (i.e., must be backordered), the user may search for and order an available substitute.
- When a user develops confidence that a required item (or substitute) is available and will be shipped within a predefined time period (UMMiPS standards), priority orders will reflect more realistic needs.

The possible effects on ICP of an improved requisitioning process should be beneficial. One benefit may be the reduction of total inventory levels. Another benefit may be reduced backorder volume. This will, however, place additional emphasis on accurate demand forecasting by the item manager, require more sophisticated determination algorithms, and foster integration of inventory and equipment maintenance data bases to improve demand forecasting.

As confidence increases that supplies can be efficiently requisitioned and priorities become more realistic of actual critical needs, transaction volumes may be expected to increase, perhaps dramatically, unless procedural changes are made at the retail levels. Instead of ordering in increments of hundreds of units of an item and keeping larger inventories at the retail level, the

retailer may order smaller lots more frequently. This increased frequency has significant implications when one considers that an ICP may already process 400,000 to 800,000 transactions per month, because each requisition can explode into multiple transactions (e.g., MRO, TCMD, reorder document, receipt document, discrepancy document). Thus, operational procedures at various levels may need to be changed to maintain control of the requisitioning process.

Initially, the greatest effect upon computer systems may be increases in on-line status inquiries. When a new capability is made available to a user community, experience has shown that the new capability will probably be overused until users verify that it will perform as advertised. Accordingly, if on-line requisition status inquiry capabilities suddenly become available to a large segment of the DoD logistics user community, the communications channels and computer systems may become overloaded with these requests. Careful planning and appropriate access levels and data retrieval quantities can reduce this potential problem.

Another important benefit that may result from the modernization of telecommunications is on-line access to commercial vendors. Using electronic data interchange, the ICP purchasing office can quickly contact several approved vendors with whom the Government has Basic Ordering Agreements to ascertain stock availability and release/shipment schedules. The order to the selected vendor can be transmitted electronically, and the ICP's system can be immediately updated with the estimated date of receipt. If conditions change, the vendor can quickly notify the ICP purchasing office by phone or electronic message with new delivery estimates. Using these new capabilities, the entire logistics community, from the ICP to the end user, can be notified of delivery and availability changes in minutes rather than days. This capability will considerably enhance management awareness of supply conditions and should result in improved weapon systems and support equipment readiness.

DEPOTS/STOCK CONTROL POINTS

Some depots/stock control points are already realizing the advantages of new technologies with implementation of new software, such as DLA's DWASP system and utilization of bar codes for control of materiel receipts. As new concepts in automation continue to be introduced, inventory

control and turnover should continue to improve, thereby reducing supply management costs. Receipt acknowledgment can be quickly (electronically) confirmed to the ICP item manager (and system) and automatically matched with contract quantity and delivery requirements. This should reduce materiel loss, improve vendor payment, and generally improve vendor relationships. On the shipment end of the process, bar code reading of materiels being packaged together should improve both inventory control and the accuracy of Government bills of lading (GBLs). It should increase the productivity of the shipping process (reducing manual annotation of the materiels being shipped) while reducing shipments of materiels to the wrong users (automated checking of items being shipped against items scheduled to be shipped). This in turn reduces discrepancy reports and re-requisitions. The effect on the depot/stock point organizations will be that fewer personnel will be able to handle larger volumes of supplies efficiently.

While reduced personnel levels are a desirable result and a worthy objective for peacetime systems, one cannot ignore the wartime implications. During mobilization, the goal is to quickly move materiel to deploying units. Modernized systems are designed to accomplish this task. However, backup procedures must be carefully designed so that if computerized systems become unavailable (electrical blackout), or if logistics traffic flow is interrupted, (sabotage to DAAS or communication networks), present procedures can facilitate a rapid shift to manual processing of materiel receipts, stowage, and shipments.

RETAIL-LEVEL USERS

Perhaps the greatest organizational effect of modernized hardware and software will occur at the retail-level users. Networked, integrated systems (including funds allocations and authorizations) would permit a supply sergeant at the unit level to immediately determine what stock is on hand (or whether an acceptable substitute is available). If not, a requisition can be automatically issued to the next higher level supply unit (intermediate supply unit or mobile resupply ship) to determine stock availability and estimated receipt time. If the materiel is not available at this level, the system can electronically switch to the next higher supply level (ICP) to

ascertain availability, shipment estimate (based on priority coding), or backorder estimated date of arrival.

The entire procedure can occur in minutes rather than days. The mechanic fixing the weapons system or support equipment can then make an informal decision to reschedule maintenance or wait for the part(s) to arrive. This type of electronic access to supply channels will also improve the backorder accuracy process, if appropriate procedures are instituted. On a periodic basis (e.g., weekly or biweekly), each requisition level can review item backorder status, by specific individual requisitioner. For example, when a base-level system is periodically initialized, the current status of all backorders can be listed. This listing could be mailed to each base unit official responsible for supply requisitions or be reviewed on a continuous basis to make sure that the list still reflects item needs. This type of procedure would require reviewing, at most, a few dozen items, rather than several hundred items, which is often the case during the current quarterly validation process. Long lead-time items, such as whole weapon systems, could be segregated from spare parts and reviewed on a less frequent basis. Maintaining the name (or position) of the specific requisitioner with the requisition at the unit level could substantially improve this important logistics management function.

Expansion of the requisition format and its direct electronic input at the unit level should improve the accuracy of both logistics management information and ordering. Electronic entry of the requisition permits immediate information validation and can ensure that all necessary information is provided the first time. For example, the requisitioner must enter a valid NSN or a part description. With the networking capabilities and massive storage capabilities now becoming available, the automated system could display the description—and possibly an item picture—on a computer screen in response to an NSN inquiry. Thus, the requisitioner could immediately verify that the correct item is being ordered. For some NSN items, the system could analyze the description and check the entire Federal Stock Catalog in seconds to ascertain whether an acceptable substitute exists. The targeted substitutes could be displayed on the screen with both a text description and a picture so that the requisitioner could respond with an immediate positive or negative

acknowledgment. On the information management side, when the requisition is entered, the system can prompt the requisitioner for each piece of required information, including not permitting the requisition to be entered until such information as the weapons system code, a valid funding code, and a shipment to address are entered and/or verified. This would ensure that all the necessary data for logistics management reporting and authorization are collected at the point of request, where the information is usually most accurate.

The end result of these automated techniques and capabilities on the field level organization should be improved weapons systems readiness/availability at a lower overall cost and a better managed logistics system at all levels.

These types of changes, made possible by today's automated technologies, should result in savings of billions of dollars in supply order lead-time, inventory turnover, and unit level stocks, while improving the entire logistics management process.

APPENDIX A

GLOSSARY OF TERMS

Some terms pertaining to the logistics activities examined in this report are highlighted in this glossary. The definitions and text illustrating the terms are derived from the 1980 Edition of the Compendium of Authenticated Systems and Logistics Terms, Definitions, and Acronyms.

Billing Office. The agency or installation accounting office having responsibility for preparing bills for services or goods. These may include reimbursable transactions performed by other than the billing office.

Carrier. Includes railroad, express companies, freight forwarders, motor carriers, barge and steamship companies, air carriers and pipeline companies.

Commodity. A group or range of items which possess similar characteristics, have similar applications, or are susceptible to similar supply management methods.

Contract Administration Office (CAO). A CAO is an office of the Defense Logistics Agency or an office of a Military Department engaged in the performance of contract administration services on contracts with private industry. This is the office having administrative responsibility for the contract after the contract has been issued or awarded. The CAO ensures the contractor meet the obligations under the Government contract.

Contracting Officer: Procuring, Administrative, and Termination. The Administrative Contracting Officer (ACO) is a contracting officer whose responsibility is to administer the performance of contracts. The Procuring Contract Officer is a contracting officer whose responsibility is to enter into contracts. The Termination Contract Officer is a contracting officer whose responsibility is to settle terminated contracts. A single contracting officer may be responsible for any or all of these duties.

Defense Transportation Operating Agencies. The three DoD organizations designated to support transportation requirements are the Military Traffic Management Command (MTMC), Military Sealift Command (MSC), and Military Airlift Command (MAC). It should be noted that

MSC and MAC are primarily mode oriented, while MTMC acts as the interface between Defense shippers and commercial and defense carriers and port operators.

Depot (Supply). A facility for the receipt, classification, storage, issue, maintenance, manufacture or assembly and salvage of materiels. A depot is usually an installation for the zone of the military area of operations.

Inventory Control Point (ICP). An ICP is an organizational unit within a DoD supply system which is assigned the primary responsibility for the materiel management of a group of items either for a particular Service or for DoD as a whole. An ICP's responsibilities include the computation of quantitative inventory requirements, the authority to procure, repair, or dispose of materiel, the development of worldwide quantitative and monetary inventory data, and the positioning of materiel.

Integrated Materiel Management. The exercise of total DoD management responsibility for a Federal Supply Group/Class, commodity or item by a single agency. It normally includes computation of requirements, funding, budgeting, storing, issuing, cataloging, standardization, and procuring functions.

Item Manager. An individual within the organization of an inventory control point or other such organization assigned management responsibility for one or more specific items of materiel.

Logistics. The functional fields of military operations concerned with: (1) materiel requirements; (2) production planning and scheduling; (3) acquisition, inventory management, storage, maintenance, distribution and disposal of materiel, supplies, tools, and equipment; (4) transportation, telecommunications, petroleum, and other logistical services; (5) supply cataloging, standardization, and quality control; (6) commercial and industrial activities and facilities including industrial equipment; and (7) vulnerability of resources to attack damage.

Materiel Management. The exercise of direction and control of all phases of supply management, including the functions of cataloging, inventory, identification, standardization, requirements determination, procurement, inspection, quality control, storage, distribution, disposal, arrangement for transportation, maintenance, mobilization planning, industrial readiness planning, and item

management classification. Synonymous with materiel control, inventory control, inventory management, and supply management.

Requisitioner. A Service, command, installation, agency, organization, or activity authorized to requisition and receive supplies.

Shipper. Any organization that tenders materiel to a carrier for movement.

Single Manager. A Military Department or agency designated by the Secretary of Defense to be responsible for management of specified commodities or common services activities on a DoD-wide basis.

Stock. A supply of materiel maintained on hand at storage points in a supply system to meet anticipated demands for it. Items issued for actual use are not considered to be in stock.

Storage Activity. An organizational unit with assigned responsibility for the physical handling of materiel, incident to receipt, storage, and shipment.

Supply. The procurement, distribution, maintenance, while in storage, and salvage of supplies, including the determination of kind and quantity of supplies.

- Producer Phase – That phase of military supply which extends from determination of procurement schedules to acceptance of finished supplies by the Service.
- Consumer Phase – That phase of military supply which extends from receipt of finished supplies by the Service through issue for use or consumption.

Supply System. The organizations, offices, facilities, methods, and techniques utilized to provide supplies and equipment to authorized users including requirements computation, procurement, distribution, maintenance-in-storage, issue, and salvage of materiel.

Supply-Point, Retail. An installation of a Service where materiel is received, stored, and normally issued to using units or activities.

Supply-Point, Wholesale. An installation of a Service where materiel is received, stored, and normally distributed to retail supply points or, where appropriate, issued to using units or activities.

APPENDIX B

LOCAL AREA NETWORKS

NETWORK TOPOLOGIES

The topology of a network is the method by which devices are interconnected and the manner in which information is transmitted between them. The selection of a topology is based on the distances between devices, the type of information being transmitted, and the communication traffic loads.

All communications systems can be described in terms of one or more of the following topologies (see Figure B-1):

- Point-to-point communication is the simplest network topology. It consists of a communications line that directly connects two devices. The point-to-point topology might be used for two hosts which must transmit a high volume of information or for a computer with a dedicated terminal.

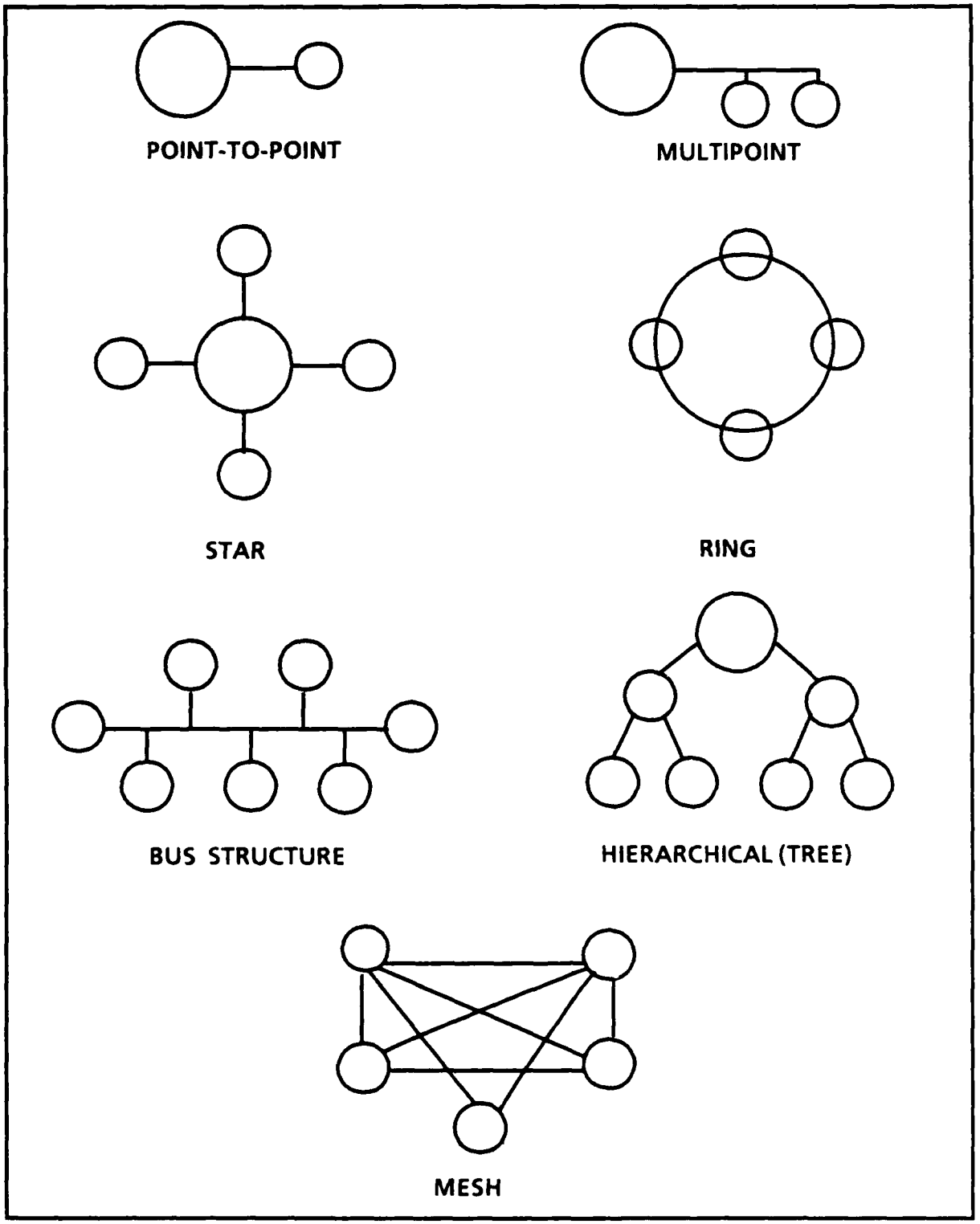
- Multipoint topology is an extension of the point-to-point system. It is typical of systems in which a number of remote stations are served by a single host. Some local area networks (LANs) are organized in this manner. The distinguishing feature of this topology is that one processor is assigned control of the entire network. This processor usually polls the other devices to determine whether they have data to transmit.

- The Star topology connects stations using a point-to-point link with a common central switch. When a station wishes to transmit, the central switch is advised, makes the connection with the distant station, and enables the initiating station to begin transmission. Once the two stations have been connected, the transmission may appear as if the connection was by a dedicated point-to-point link. The local telephone company's central offices operate using this topology. A computer time-sharing system is another example.

- The Ring topology connects stations using repeaters connected in a closed loop. Data circulates around the ring in one direction. Since multiple devices share the ring, a more sophisticated control is needed to permit stations to insert packets of data that are transmitted from the transmitting station around the ring, to the receiving station. If a transmitting station has completed its transmission or has no data to transmit, it passes control to the next station on the ring. This topology is used for LANs.

- A Bus topology operates through the connection of all stations to a single transmission medium. All transmissions are bidirectional. Stations access the transmission medium using contention protocols that are based on a first-come/first-served procedure. This topology is one of the most commonly used for LANs.

FIGURE B-1. CHARACTERISTIC NETWORK TOPOLOGIES



- A Tree topology operates through the hierarchical definition of communication relationships. All devices attached to the tree communicate directly with the devices above them in the tree structure. Communications with other devices in the structure are routed through the device above them. This structure is typical of organizations requiring a multi-level data processing approach. It is used by the banking industry and the retail industry.

- The Mesh topology is configured to permit direct communication among all devices attached to the system. This topology can also be modified to include a partial mesh in which communications paths do not exist between all devices. The mesh topology provides the most rapid and reliable form of communication. For a widely distributed system, however, it is expensive to implement. Mesh topologies are found in wide area networks (WANs) where redundant paths between switches are required.

The topology used for a communications system design is important because it affects the cost, performance, reliability, and availability of the system.

LOCAL AREA NETWORK (LAN)

A LAN is a communications network that interconnects a variety of data communicating devices within a small area. Data communicating devices may include computers, terminals, peripheral devices, sensors (temperature, humidity, security sensors), telephones, and television transmitters and receivers. Communications within a small area might include an individual building or a campus, such as a military base.

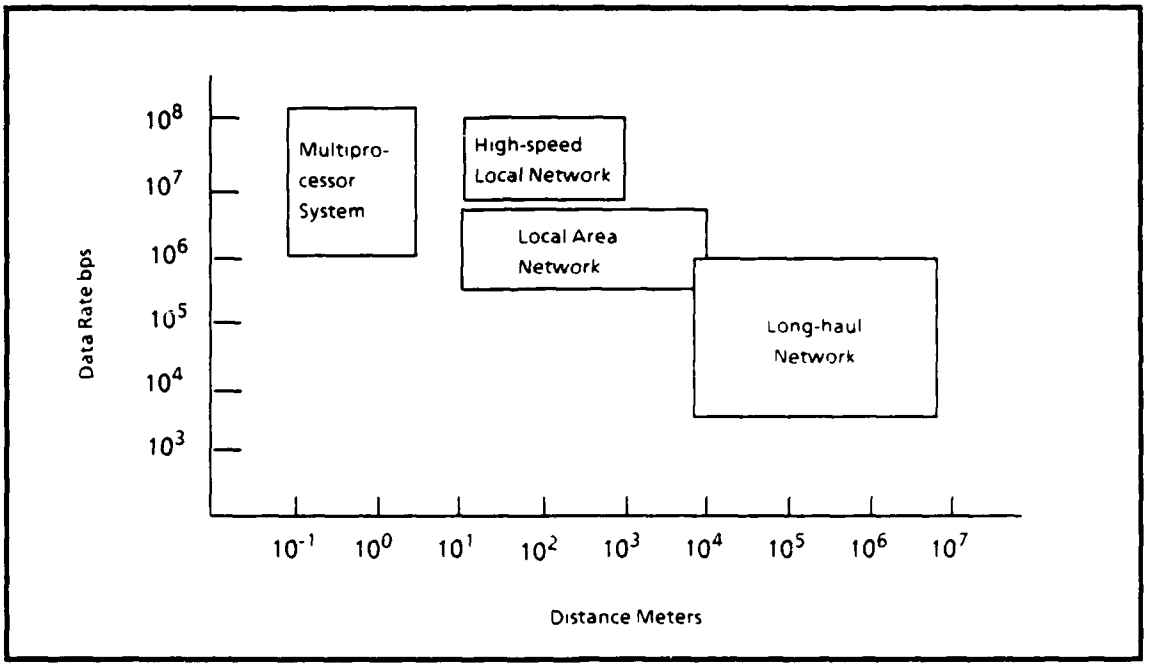
Typical characteristics of LANs include high data rates of 0.1 to 100 Mbps, short distances of 0.1 to 25 kilometers, and low error rates of 10^{-8} to 10^{-11}. A comparison of LAN characteristics with those of other types of data networks is presented in Figure B-2.

LAN Characteristics and Protocols

One common characteristic of many LANs, is that all devices connected to the network can access the communications medium with equal priority. Therefore, most LANs are designed using either a bus or a ring topology. Since all devices have equal priority, it is necessary to employ access methods that prevent more than one device from transmitting at the same time.

Two techniques are used to achieve this objective. The first is a contention technique known as Carrier Sense Multiple Access/Collision Detection (CSMA/CD). This technique requires the transmitting device to "listen" before transmitting any data for a fixed period of time (carrier sense). Once data transmission has begun, the device continues to listen, to determine whether

FIGURE B-2. COMPARISON OF NETWORK CHARACTERISTICS



another station has started to transmit (collision detection). The Ethernet protocol is the most common application of the CSMA/CD technique. The IEEE 802.3 standard, used to define the most recent version of the Ethernet protocol, has been widely accepted as a communications standard for LANs.

The second most commonly used technique is the token ring. This protocol uses a ring topology. It operates by sequentially providing all devices connected to the ring with the opportunity to transmit data if they have any to transmit. When the transmission is complete, or if there are no data to transmit, the device sends a message to the next device on the LAN, with a bit known as the "token bit" set to a specific value indicating that the receiving device can now transmit data. Transmission of the message with a token bit is known as "token passing." The IEEE 802.4 standard has been established for the token passing protocol.

The CSMA/CD protocol is installed at more locations than the token ring because it represents a simpler architecture. The token ring offers one significant advantage over CSMA/CD, related to the loading of the network: the access delays experienced with the CSMA/CD protocol

increase exponentially when traffic on the LAN exceeds approximately 20 percent. At the 30-percent level, the delays are unacceptable. The token ring LAN also experiences some degradation, but unacceptable delays occur only when the traffic exceeds 50 percent utilization. The token ring should be considered for LANs on which high volumes of traffic are anticipated.

Types of Transmission

Two types of transmission are used with LANs: baseband transmission and broadband transmission. Baseband transmission involves the transmission of signals without modulation. The individual digital bits (1's and 0's) are inserted in the cable as voltage pulses. The entire available frequency spectrum of the cable is used in this transmission. As a result, only one device can transmit data at a time.

In Broadband transmission, digital signals are modulated using a modem which serves as an interface with the cable. The cable is divided into frequency bands, or channels, of 6 megahertz (Mhz), and the modem must transmit the data in one of these bands. A broadband cable can be divided into as many as 58 channels. Broadband technology is the technology used in cable television. In effect, the broadband cable operates as though it consisted of 58 independent channels, each carrying its own information.

The Hyperchannel being installed by the DAASO is a baseband LAN which operates at a high data rate of 50 Mbps. This device uses the CSMA protocol without collision detection. The transmitting device recognizes that a collision has occurred when its transmission is not acknowledged. The high data rates of the Hyperchannel provide a capacity equivalent to many broadband LANs. However the data rates used limit the length extent of the cable installation to 300 km. Longer cable lengths are possible with larger diameter cable.

APPENDIX C

OPEN SYSTEMS INTERCONNECTION (OSI)MODEL

THE OSI MODEL

In 1977, the International Standards Organization (ISO) established a subcommittee to develop an architecture for defining processing functions performed in a data communications system. This subcommittee produced a model known as the Open Systems Interconnection (OSI) model that serves as a framework for defining standards for linking heterogeneous computers. The OSI model uses a structuring technique known as layering.

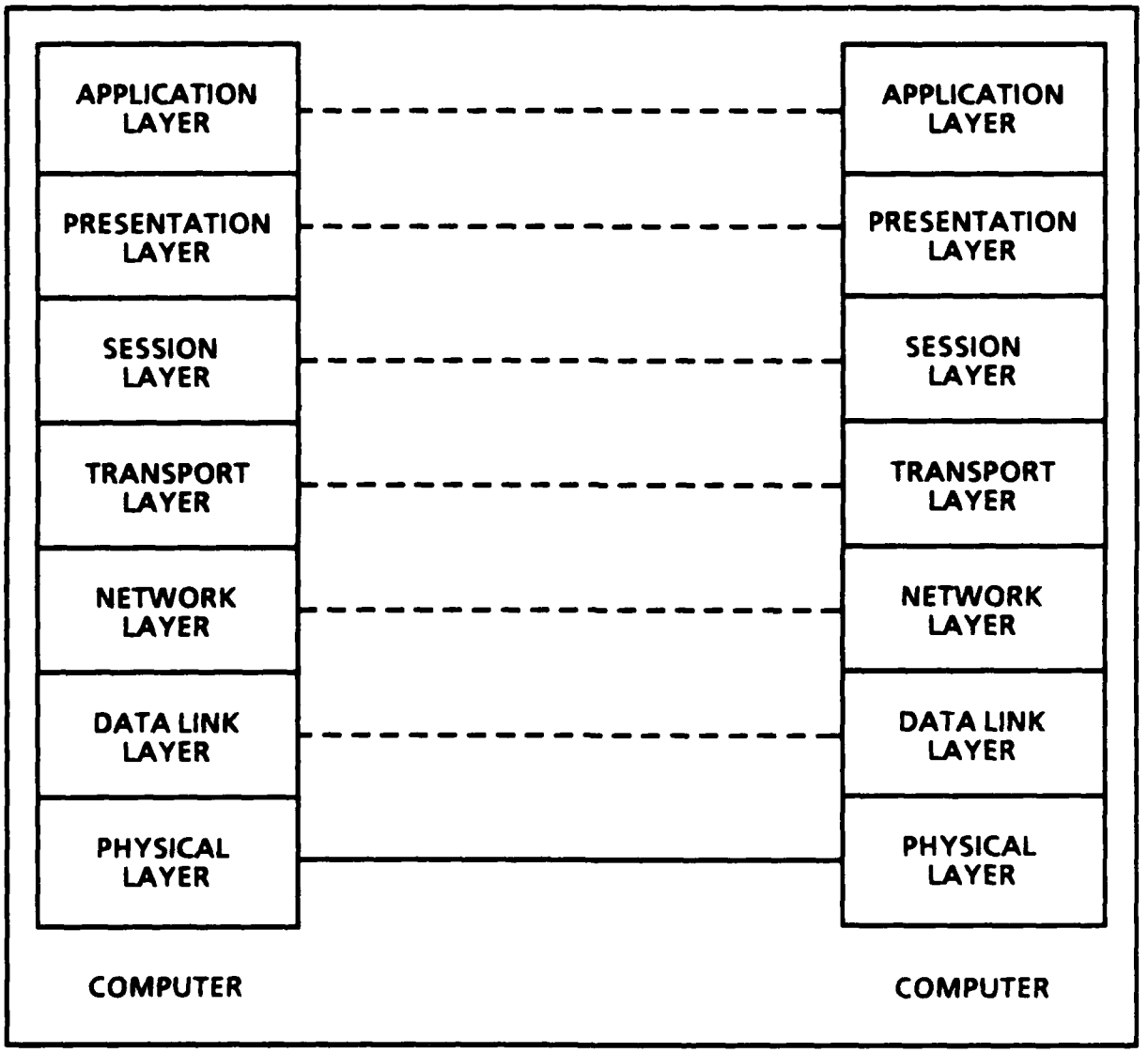
In this model, communications functions are divided into a hierarchical set of layers. Each layer performs a related subset of functions required to communicate with another system. Each layer relies on the next lower layer to perform more primitive functions. For the communications system to operate, the same set of layered functions must exist in the two communicating systems. The peer (corresponding) layers in the two different systems communicate using a set of rules or conventions known as protocols. A protocol is defined by syntax, semantics, and timing. Syntax includes data format and signal levels. Semantics are the control information for coordination and error handling. Timing includes speed and sequencing. A graphical description of the OSI model is presented in Figure C-1. The dashed lines in this figure represent the layers which must be compatible with each other for successful system operation. The solid line indicates the layers that are physically interconnected with each other.

The OSI model has seven layers:

- Layer 1 – Physical Layer: This layer is responsible for the transmission of an unstructured bit stream using a physical link. It defines the mechanical, electrical and procedural characteristics required to establish, activate, and maintain a link.

- Layer 2 – Data Link Layer: This layer controls the flow of information between devices. It groups bits into frames, controls the data transmission rates, adds the header and trailer (control bits) into frames, and holds the data for transmission until the receiving device is ready to accept it. The Data Link Layer also defines the manner in which errors occurring at the physical layer will be detected and corrected.

FIGURE C-1. OSI COMMUNICATIONS LAYER STRUCTURE



- Layer 3 – Network Layer: This layer defines the manner in which packets of data are transmitted through a network. A message may be made up of more than one packet. The routes followed by the packets may be independent (datagram), or all the packets in a message may follow the same route (virtual circuit). The network layer defines the routing, addressing and congestion control associated with these transmissions paths.

- Layer 4 – Transport Layer: This layer defines the error recovery procedures that will be used, and provides end-to-end flow control. Flow control is used to ensure that the transmitting device is not sending more data than can be accepted by the receiving device.

- Layer 5 – Session Layer: This layer defines the manner in which connections (sessions) between devices are established, managed and terminated. It also defines checkpoints and restart services in the event that communications are interrupted.

- Layer 6 – Presentation Layer: This layer defines the interface between the communications system and the applications programs. The presentation layer also defines processing activities that may serve a common requirement of both the communications and applications programs such as encryption, text compression, and reformatting.

- Layer 7 – Applications Layer: This layer includes the user software such as data base management programs or accounting software.

It is not necessary to define all seven layers for every communications system. For example, a system that is made up of two processors that are directly connected with each other does not require the definition of the network layer. Alternatively, some systems include the use of multiple processors and interfaces to perform the overall communications task. In these cases, different layers must be defined at various points in the communications system.

Figure C-2 demonstrates the use of the OSI model to represent the case of a system which uses front end processors (FEPs). Figure C-3 is an example of a system that uses an interface controller to access a communications system such as a local area network. From these examples, one can see that the use of interface equipment such as the (FEP) or the interface controller can provide the ability to modify the design of the processor (host) containing the applications programs without requiring redesign of the communications system, since design changes in the host processor are accommodated through the modification of the interface device. In some cases, current modernization activities of the Services are making use of FEPs in this manner. The Intelligent Gateway Processor that will be used by the Air Force Logistics Command is an example of such a device. FEPs offer a potential capability for rapidly modifying a system in response to changing interface or processing requirements that occur in the defense logistics information communications systems.

FIGURE C-2. OSI MODEL FOR FRONT-END PROCESSOR (FEP)

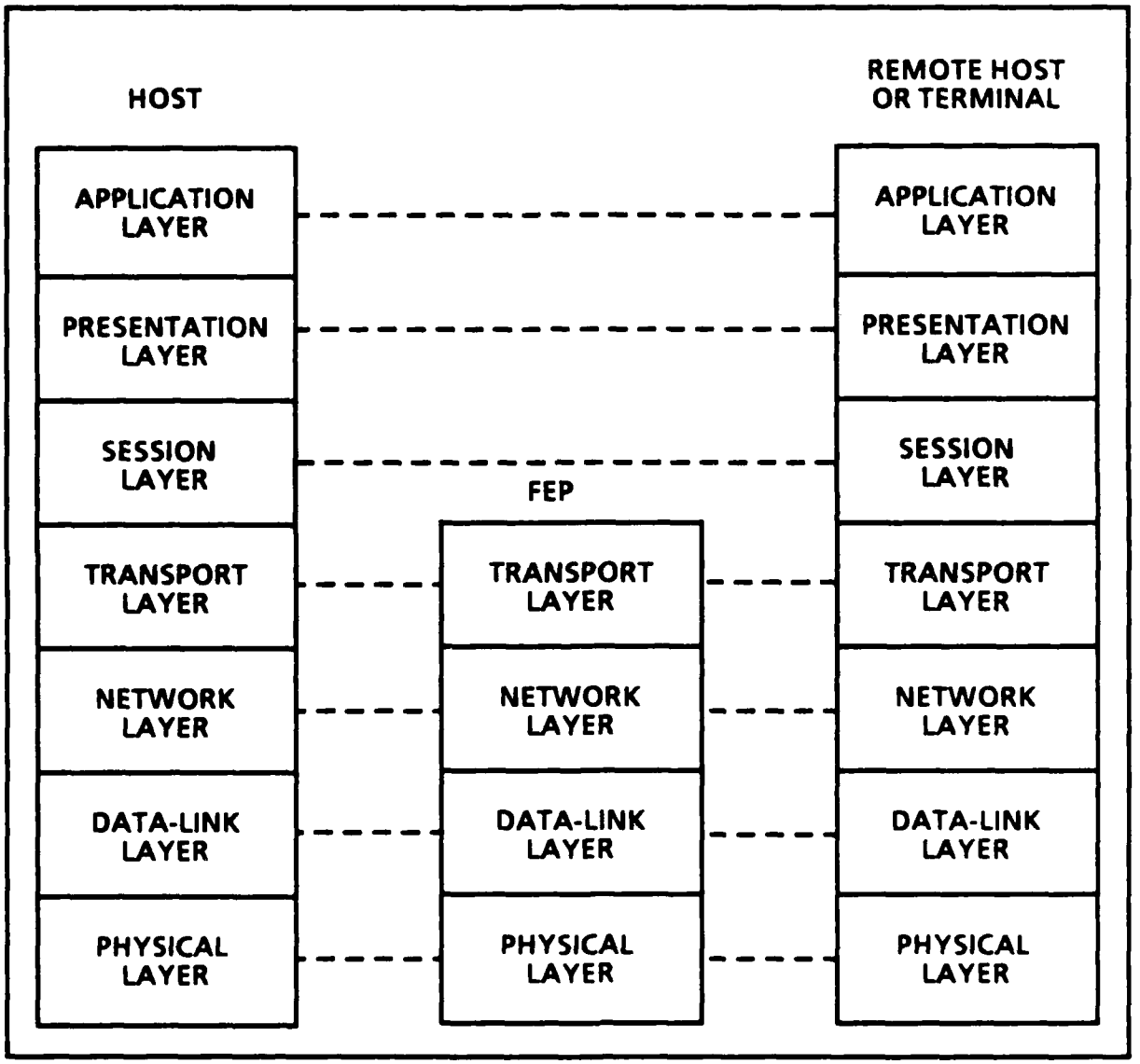
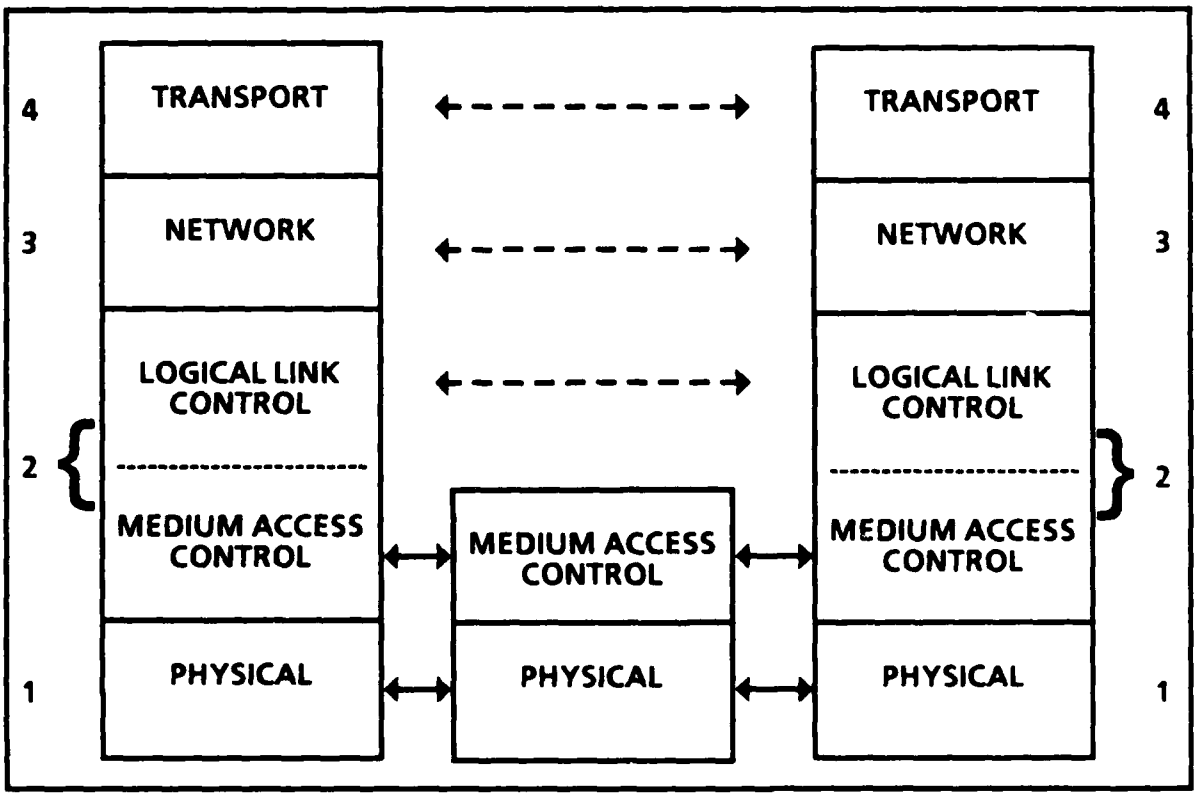


FIGURE C-3. OSI LIKE MODEL FOR A LAN



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